PB90-163544

Superfund Record of Decision (EPA Region 1): W. R. Grace Acton, Massachusetts (First Remedial Action), September 1989

(U.S.) Environmental Protection Agency, Washington, DC

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EPA/ROD/R01-89/040
September 1989

EPA

Superfund Record of Decision:

W.R. Grace, MA

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The W.R. Grace (Acton Plant) site is in Acton and Concord, Massachusetts. The American Cyanamid and Dewey & Almy Chemical companies formerly owned the 200-acre site where they manufactured explosives, synthetic rubber container sealant products, latex products, plasticizers, and resins. In 1954 W.R. Grace & Company purchased the property and began producing container sealing compounds, latex products, and paper and plastic battery separators. Effluent wastes from these operations flowed into several unlined lagoons and were later buried in onsite waste areas, including an industrial landfill. After a 1978 investigation revealed that ground water in the vicinity of the site was contaminated with VOCs, W.R. Grace & Company agreed to fully restore the aquifer. An aquifer restoration system was installed in 1985 which recovers and treats ground water under the site's waste disposal areas. Subsequent samplings, however, have indicated that the system has only minimally reduced the ground water contamination at the site. This first operable unit primarily addresses the source contamination and includes minimal modifications to the aquifer restoration system. Further ground water remediation will be addressed in a subsequent Record of Decision. The primary contaminants of concern affecting the soil, sediment, and sludge are VOCs including benzene and toluene, other organics, and metals included arsenic. (See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - W.R. Grace, MA
First Remedial Action
Contaminated Media: soil, sediment, sludge
Key Contaminants: VOCs (benzene), other organics, metals (arsenic)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 209
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(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

16. Abstract (continued)

The selected remedial action for this site includes excavation and offsite incineration of highly contaminated soil and sludge; onsite solidification of less contaminated soil, sludge, and sediment followed by onsite disposal in the landfill and capping of the landfill; covering and monitoring other waste areas; modification to the aquifer restoration system to address air stripper emissions controls; and environmental monitoring. The estimated total cost for this remedial action is $7,058,000, which includes an estimated O&M cost of $2,468,000.

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DECLARATION OF RECORD OF DECISION

SITE NAME AND LOCATION

W. R. Grace & Co. (Acton Plant)
Acton, Massachusetts

STATEMENT OF PURPOSE

This Decision Document presents the selected remedial action for the W. R. Grace & Co. (Acton Plant) Site in Acton, Massachusetts developed in accordance with the Comprehensive Environmental Response, Compensation and liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

STATEMENT OF BASIS

This decision is based on the administrative record which has been developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Acton Public Library in Acton, Massachusetts and at the Region I Waste Management Division Records Center in at 90 Canal Street, Boston, Massachusetts. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses the first of three planned activities at the Site. To implement a complete Site cleanup, EPA has organized the work in three operable units (UOs):

OU One:	Disposal areas and surficial contamination areas at the Site.
OU Two:	Residual contamination in disposal areas at the Site following implementation of OU One.
OU Three:	Contaminated groundwater and the establishment of groundwater target cleanup goals.

The first OU is the remedy selected to remediate sources of contamination at the Site. The remedial measures described in this ROD will protect the drinking water aquifer by minimizing further contamination of the groundwater and surface water, and will eliminate the threats posed by direct contact with or ingestion of contaminants in soils and waste sludges at the Site.

The major components of the selected remedy include:

- Excavation and transportation off-site for incineration of highly contaminated material from the Blowdown Pit;
- Excavation and stabilization of the remaining contents of the Blowdown Pit, as well as the contaminated sludges and soils of the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon;
- Excavation of contaminated soils from the Battery Separator Lagoons, Boiler Lagoon, and Tank Car area;
- Placing both the stabilized and the non-stabilized materials excavated from the site on the existing Industrial Landfill, and covering these materials with an impermeable cap;
- Post excavation sampling and analysis;
- Capping the Battery Separator Chip Pile;
- Covering any disposal area which attains the Soil Cleanup Goals:
- Modifying the Aquifer Restoration System (ARS) to address air stripper emission controls; and
- Establishing long term environmental monitoring at each disposal area designed to monitor the effectiveness of the proposed remedy.

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action and is cost-effective. This remedy satisfies the statutory preference for remedies that utilize treatment as a principal element to reduce the toxicity, mobility, or volume of hazardous substances. In addition, this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Sept 29, 1989
Date

Paul Keough
Paul G. Keough, Acting
Regional Administrator

W. R. Grace Site - Acton, Massachusetts
Record of Decision Summary

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ROD DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

SITE NAME: W. R. Grace & Co. (Acton Plant)
SITE LOCATION: Acton, Massachusetts
SITE DESCRIPTION: The W. R. Grace Superfund Site (the Site) is located in Acton and Concord, Massachusetts, off of Independence Road, and is composed of approximately 200 acres bounded to the north in part by Fort Pond Brook and to the east and south by the Assabet River. Industrial parks border the site to the south and residential housing borders the site on the northeast. American Cyanamid Company and the Dewey & Almy Chemical Company (D&A) were former occupants of the Site. American Cyanamide manufactured explosives, and Dewey & Almy Chemical Company produced synthetic rubber container sealant products, latex products, plasticizers, and resins.

W. R. Grace & Co. (Grace) acquired the property in 1954. Historical operations at the W. R. Grace facility included the production of materials used to make concrete and organic chemicals, container sealing compounds, latex products, and paper and plastic battery separators. Effluent wastes from these operations flowed into several unlined lagoons (the Primary Lagoon, Secondary Lagoon, North Lagoon and Emergency Lagoon), and were buried in or placed onto an on-site Industrial Landfill and several other waste sites. These other waste sites include the Battery Separator Lagoons, the Battery Separator Chip Pile, the Boiler Lagoon, and the Tank Car Area. Periodically, sludge from the primary lagoon was mucked out, dried along the banks, and trucked to the landfill for disposal. In addition, the by-products of some chemical process were disposed of in the Blowdown Pit. Discharge to all lagoons and the Battery Separator Area ceased in 1980 (see Figure 1). A more complete description of the site can be found in the report submitted by Grace under the Section XI.C. of the Consent Decree entitled the "Phase Four Site Closure Plan" (the Phase IV Report).

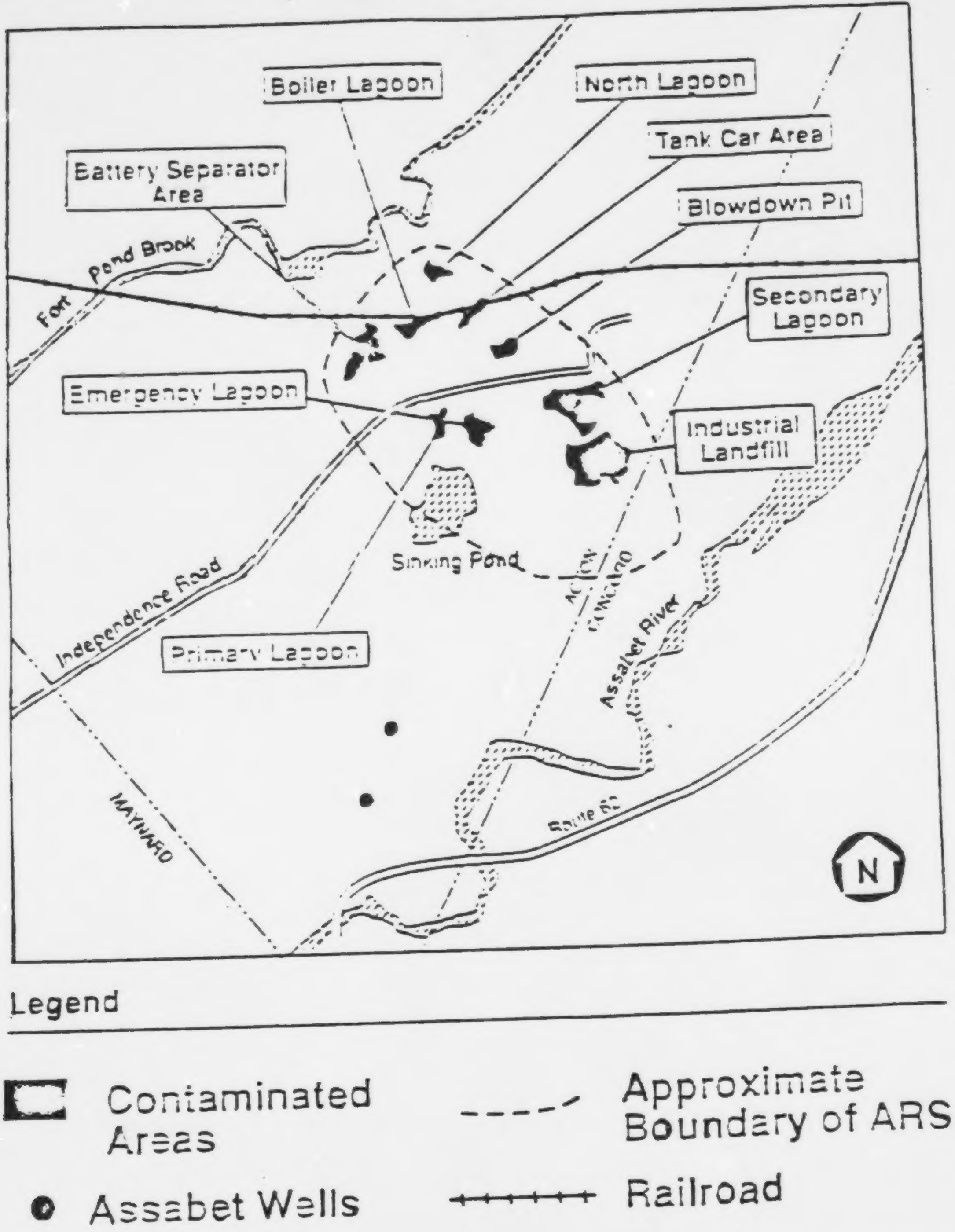
II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Response History

Investigations in 1978 indicated that two municipal wells, Assabet #1 and #2, were contaminated with vinylidene chloride (VDC). Significant levels of vinyl chloride, ethylbenzene and benzene were also detected at that time. As a result of these findings, the Town took the precautionary action of closing the two wells. The United States sued Grace on April 17, 1980 to require cleanup of the Site in an action entitled U.S. v. W. R. Grace & Co, U.S. District Court for the District of Massachusetts, Civil Action No. 80-748-C. In October 1980, the

FIGURE 1

W.R. Grace Superfund Site Features Map


Boiler Lagoon
North Lagoon
Tank Car Area
Battery Separator Area
Blowdown Pit
Fort Pond Brook
Secondary Lagoon
Emergency Lagoon
Industrial Landfill
Sinking Pond
ACTON
CONCORD
Independence Road
Assabet River
Primary Lagoon
MAYNARD
Route 62
N
Legend
Contaminated Areas
Approximate Boundary of ARS
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Railroad

EPA and Grace entered into a Consent Decree which outlined a procedural framework for site cleanup. The Consent Decree outlined a phased program to plan and undertake cleanup of the various waste disposal sites and restoration of groundwater in drinking water aquifers that have been contaminated by the facility. The Consent Decree requires Grace to clean up and restore the quality of the drinking water of the Sinking Pond Aquifer, the source of water for Assabet Wells #1 and #2 to a fully usable condition as a public drinking water supply. The requirements of the Consent Decree are similar to those of an Administrative Order issued by the Massachusetts Department of Environmental Protection (DEP)(formerly the Department of Environmental Quality Engineering) in July 1980. DEP issued an Amended Order in April 1981 to conform with requirements of the Consent Decree between EPA and Grace.

Based on the results of investigations started in 1978, on September 8, 1983 EPA amended the NCP to add the Site to the National Priorities List (NPL), established pursuant to Section 105 of CERCLA (48 FR 40658).

Under Section XII of the Consent Decree, which relates to cleanup of the aquifer, Grace initiated development of an engineering plan for aquifer cleanup and accelerated restoration to a fully usable condition. The first steps evaluated the Site hydrogeology and a characterized the extent and nature of groundwater contamination. Two types of models, one for simulating groundwater flow and the other for simulating contaminant transport, were developed and calibrated early in the study process. The models were used to analyze the transport and fate of contaminants from the various waste sites and to develop a conceptual design for the Aquifer Restoration System. Using the results of these investigations and subsequent groundwater monitoring results, Grace designed a recovery well network it expected would contain contaminated groundwater in a "capture zone," thus preventing further migration off-site. Contaminated groundwater extracted from the network of wells then would be either pumped to a central treatment facility or treated at the well-head.

Following EPA and Massachusetts approval of Grace's aquifer restoration system design, Grace constructed a groundwater recovery and treatment system, called the Aquifer Restoration System (ARS), in March 1985. Since March 1985, W. R. Grace has been operating the system which recovers and treats the groundwater under the waste disposal units. In addition, Grace has been conducting a program for monitoring the contaminated aquifer and the implementation of restoration measures. Monitoring indicates that there is contamination outside the area of containment of the ARS.

The Aquifer Restoration System presently consists of eight pumping wells, discharging to a packed tower air stripper which, in turn, discharges the treated water to Sinking Pond. There are two bedrock wells, NLBR and SLBR, which serve to collect bedrock aquifer contamination. There are six sand and gravel aquifer wells. The NLGP and SLGP wells collect overburden aquifer contamination. The ELF, WLF and RLF wells collect contamination originating from the Landfill and the Secondary Lagoon. The NMGP well was installed later with its principal purpose to establish groundwater containment under the North Lagoon. All collected water is discharged directly to Sinking Pond after treatment at the ARS stripping tower.

The RP-1 bedrock recovery well and packed tower air stripper was installed in 1984 as part of a pilot treatability study. It has been operating continuously since that time and continues to remove volatile organic contamination in the bedrock aquifer in the northern portion of the Mass. Broken Stone Pit. Most of the contamination in the Broken Stone Pit lies in the bedrock.

Since the ARS startup, groundwater at the site has been sampled on a periodic basis. Grace has submitted fifteen progress reports to date documenting the operation of the ARS including the results of the sampling. The data show that the Aquifer Restoration System has established a zone of containment under the disposal areas. However, there is significant contamination outside the area of containment. There continues to be uncertainty with respect to the area of containment to the northeast and east of the secondary lagoon. Groundwater level data indicates that this area is almost completely flat, and the location of the groundwater flow divide is not certain. Until the NMGP was installed in November 1987, groundwater under the North Lagoon was not being contained.

The Aquifer Restoration System has produced in some areas a reduction in contamination in the groundwater both within and downgradient of the containment zone. The extent of reduction varies, with some areas being cleaned up very slowly. However, in some areas there has been no discernable downward trend.

The second response activity, which is governed by Section XI of the Consent Decree, requires Grace to assess and control sources of waste on-site. The requirements of the Consent Decree correspond to those established under the National Contingency Plan promulgated by EPA at 40 CFR Part 300 for evaluating and responding to Superfund sites. Specifically, the Consent Decree established a phased investigation under EPA oversight. In Phases I and II, Grace was to prepare plans for studying and determining the nature and extent of contamination "on, in, beneath, and immediately surrounding the landfill, all lagoons and all other waste disposal sites," and, after EPA approval, perform the study. The Phase I and II studies correspond to the Remedial Investigation requirements for NPL sites set forth in 40

CFR § 300.68(d) and (e). In Phase III of the source investigation, Grace was to "identify, analyze, and evaluate cleanup and remedial measures that will correspond to the nature and extent of contamination." Following conditional approval of the Phase III scope of work, Grace performed the evaluations and submitted the results to EPA and DEP under Phase IV of the Section XI of the Consent Decree (the "Phase IV Report"). The development, screening, and detailed evaluation of the remedial alternatives required under Phases III and IV of the Consent Decree parallel the requirements of the NCP for a Feasibility Study under 40 CFR § 300.68(f), (g) and (h). The one feature of the Consent Decree process that differs from the NCP procedure is that the Phase IV Report will also include a remedial plan of action with one or a combination of the cleanup and remedial measures evaluated in the report. Grace submitted the first draft Phase IV report on February 17, 1987, and submitted a second complete draft Phase IV Report containing substantial revisions to address comments from the EPA and DEP on August 31, 1988. Following a series of meetings in 1989 to discuss information needs and suggested revisions to the recommended remedy between Grace, EPA, DEP and representatives of the Town of Acton, Grace submitted an Addendum to the August 1988 draft Phase IV Report on June 6, 1989.

Under the Consent Decree, Grace is to implement the remedial measures of the Phase IV report that are approved by the EPA. The remedial measures evaluated in the Phase IV Report and the Addendum provide much of the analysis for the remedy that is being selected in this Record of Decision. Upon the issuance of this ROD, EPA will take actions under the Consent Decree to approve a remedial plan of action consistent with the remedy selected here.

B. Enforcement History

On April 17, 1980, the U. S. Department of Justice filed an a civil action against Grace under Section 7003 of Resource Conservation and Recovery Act (RCRA) seeking a judicial order for Grace to abate an imminent and substantial endangerment to human health and the environment at Grace's Acton facility. The action entitled U.S. v. W. R. Grace & Co, was filed in the U.S. District Court for the District of Massachusetts, Civil Action No. 80-748. Shortly thereafter, on July 14, 1980, the Massachusetts DEP issued an administrative order to Grace specifying procedures and requirements for evaluating and correcting Site contamination. EPA and Grace settled the action, agreeing on a Consent Decree and judicial order that was filed with the Court on October 21, 1980. The provisions of the Consent Decree are similar to the requirements of the DEP Order, which DEP amended to conform with the Consent Decree language on April 15, 1981.

Under the Consent Decree, Grace has been responsible for conducting the evaluations and analyses necessary for EPA and DEP approval of remedial measures at the Site. Since 1980, Grace has implemented an approved groundwater recovery and treatment program, referred to as the Aquifer Restoration System, and continues to monitor groundwater as required by the Decree to evaluate the impact of Site contamination on the aquifer. Grace has also proceeded to evaluate the sources of contamination at the facility under government oversight, and presented the results of the Site evaluation to the public in December 1988. Following submittal of the draft Phase IV Report in August 1988, Grace met a number of times with EPA and DEP to discuss the government parties' comments. Summaries of issues discussed in those meetings are included in the Administrative Record for this Site, together with Grace's Phase IV Report, the Addendum to the Phase IV Report, and comments submitted by Grace on the EPA Proposed Plan.

Special notice has not been issued in this case because Grace is operating in compliance with a Consent Decree that governs the cleanup at the Site.

III. COMMUNITY RELATIONS

Community interest and involvement in EPA activities at the W.R. Grace site has been exceptionally high throughout most of the history of EPA involvement at the site. Since 1983, when the site was added to the National Priorities List, EPA has conducted activities to keep the community and other interested parties apprised of Site activities through informational public meetings, press releases, telephone contact with interested community members and local officials, and the involvement of representatives of the Town of Acton in discussions of technical plans and progress.

In August 1984, EPA and the Massachusetts Department of Environmental Protection (DEP) held a public meeting to discuss the Aquifer Restoration System, and plans for future study of the site. Also in 1984, EPA initiated weekly technical meetings involving the participation of W.R. Grace, EPA, DEP, consultants employed by the Town of Acton, and local Acton officials.

Upon completion of a site investigation and evaluation of alternatives to address the sources of site contamination, EPA and DEP released the results of the site studies in the Draft Phase IV Closure Plan prepared by W.R. Grace. Upon release of the Draft Phase IV Closure Plan, the report was made available at the Acton Public Library. In December 1988, EPA and DEP held a public informational meeting in Acton at which W.R. Grace representatives presented the Closure Plan. The meeting also included opportunity for public questions and comments.

In May, 1989, as a result of petition from citizens to the DEP asking for the site to be designated as a Commonwealth of Massachusetts Public Involvement Plan site, EPA and DEP met with interested citizens to discuss community concerns, avenues through which site information would be supplied to the community, and opportunities for public involvement in the process for achieving a Record of Decision at the site. Following this meeting EPA and DEP maintained telephone contact and written correspondence to apprise the citizen's group of plans for public meetings and the projected schedule for public comment opportunities. EPA is currently working with DEP on a joint Community Relations Plan to establish mechanisms for public involvement during the remedial design and remedial action phases of site activity. The plan will be presented to the community for comment in autumn, 1989, prior to finalization.

In July of 1989, EPA made the Administrative Record available for public review at EPA's offices on 90 Canal Street in Boston, and in Acton at the Acton Public Library. On August 9, 1989, the EPA published a public notice and brief analysis of the Proposed Plan for source control at the site in the Middlesex News. The public notice also announced the availability of documents for review as part of the Administrative Record, and provided information on the dates for a public information meeting, informal public hearing and comment period. This same information was also released in press release form to the media and to the approximately 500 interested and affected parties on the site mailing list. To facilitate public involvement further, the Proposed Plan for the site was also mailed directly to all those on the site mailing list.

On August 14, 1989 the Proposed Plan for addressing sources of contamination and other new documents were made available for public review as part of Administrative Record. Also on August 14, 1989, a public informational meeting was held in Acton to review the Proposed Plan and provide opportunity for public discussion. From August 15, 1989 to September 15, 1989, the Agency held a four week public comment period to accept public comment on the alternatives presented in the draft Phase Closure Plan, the Closure Plan Addendum, Proposed Plan and on the other documents that are a part of the Administrative Record for the site. On September 12, the Agency held an informal public hearing to accept any oral comments. A transcript of this informal hearing and summary of the comments received and EPA responses are included in the attached responsiveness summary.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

This ROD addresses the first of three planned activities at the Site. To implement the Site cleanup under the Consent Decree, EPA has organized the work into three operable units (OUs), which are:

OU One:	Disposal areas and surficial contamination areas at the Site.
OU Two:	Residual contamination in source areas at the Site following implementation of OU One.
OU Three:	Contaminated groundwater in the area of the Acton facility that is not contained or adequately addressed by the Aquifer Restoration System.

The first OU is the remedy selected in this ROD to remediate sources of contamination at the Site. The remedial measures authorized by this ROD will protect the drinking water aquifer by minimizing further contamination of the groundwater and surface water, and will eliminate the threats posed by direct contact to or ingestion of contaminants in soils and sludges at the Site. OU One establishes Soil Cleanup Goals to be attained at each of the disposal areas and establishes post-excavation sampling and analysis requirements to determine whether the Soil Cleanup Goals have been met by the excavation activities described in this OU. This remedy will be satisfied at a particular disposal area if the levels of residual contamination are equal to or less than the established levels. The remedy selected for OU One is described below in Section X.

It is anticipated that two other operable units may be necessary to obtain a comprehensive remediation of contamination in soils and groundwater. OU Two would follow the excavation and post-excavation analysis activities of this ROD if residual contamination in soils under a disposal area exceeds the Soil Cleanup Goals of this ROD. If further remediation is necessary because the established cleanup goals have not been attained from excavation of contamination, supplemental remedial measures would be evaluated and selected to attain the cleanup goals. The evaluation and selection of a technology to utilize in a second operable unit would be subject to the same decision criteria and procedures used by EPA and DEP in the selection of this remedy, and would result in another ROD.

A third operable unit will evaluate the extent of groundwater contamination on- and off-site and establish groundwater target cleanup levels for groundwater that has been contaminated by the Site. OU Three will determine whether additional remedial measures are necessary to restore the groundwater affected by the site to a fully usable condition in the shortest practical time and to protect public health and the environment. This third operable unit will include an evaluation of the ARS to determine if it is adequately containing contaminated groundwater from the site, is adequately remediating the groundwater affected by the site, and will establish groundwater target cleanup levels. OU Three may also require remedial measures if groundwater monitoring which is part of OU One indicates that groundwater contamination is not being remediated by the existing ARS or if contamination at the site is not being adequately contained by the ARS. If further measures are deemed necessary to remediate groundwater contaminated by the Site, the selection of such measures would be subject to the same decision criteria and procedures used by EPA and DEP in the selection of this remedy, and would result in another ROD.

V. SITE CHARACTERISTICS

As part of the investigations of contamination sources conducted under the Consent Decree, Grace conducted field investigations to assess the nature and extent of soil, groundwater, surface water and sediment contamination resulting from previous disposal activities at the W. R. Grace site. Section 4 of the Phase IV Report contains an overview of the investigations. The significant findings of the investigations are summarized below.

A. Source Areas

1. Primary, Secondary and Emergency Lagoons

The Primary, Secondary and Emergency Lagoons received process wastewater from the Organic Chemical plant which formerly occupied the area north of the three lagoons. The Primary Lagoon received wastewater directly from the plant and most of the solids settled to the bottom. The supernatant was pumped to the Secondary Lagoon where the finer solids settled. The Emergency Lagoon received plant wastewater directly when the Primary Lagoon was closed for dredging.

The Primary Lagoon has a surface area of about 24,000 square feet. The lagoon has nearly vertical sidewalls and lies within a depression. Sludge volume in and around the lagoon was estimated at 5,000 cubic yards in the 1982 Sampling and Analysis Report. Sludge depth varies from 2 to 6 feet with the deepest deposit at the northern end. Underlying soils are primarily fine to medium sands. The groundwater table lies approximately 20 feet below the bottom of the sludge layer. Discharge of process wastewater to the Primary Lagoon ceased in 1980. During its operating life, the Primary Lagoon was dredged approximately every other year. Sludges were placed next to the lagoon and allowed to dry. Final disposal of most of the dredged sludge was on site at the industrial landfill. Some dried sludge piles (approximately 50 to 100 cubic yards) remain near the Primary Lagoon. Contaminants present in the Primary Lagoon sludges and underlying soils include but are not limited to VDC, vinyl chloride, ethyl benzene, and benzene.

The Secondary Lagoon has a surface area of approximately 100,000 square feet. The sludge volume for this lagoon is estimated at 5,000 cubic yards. The groundwater table lies approximately 40 feet below the bottom of the sludge. The soils under this lagoon are primarily fine sand. Discharge to the Secondary Lagoon ceased in 1980. Contaminants present in the Secondary Lagoon sludges and underlying soils include but are not limited to VDC, vinyl chloride, ethyl benzene, and benzene.

The Emergency Lagoon lies between the Primary and Secondary Lagoons. Its surface area is approximately 24,000 square feet. Sludge volume is estimated at 1,800 cubic yards. The underlying soils are primarily fine sands with thin layers of silt. Depth to groundwater is about 34 feet. Contaminants present in the Emergency Lagoon sludges and underlying soils include but are not limited to VDC, vinyl chloride, ethyl benzene, and benzene.

2. Industrial Landfill

The Industrial Landfill operated from the early 1950's until 1980. During those years, the landfill received waste materials from Grace's operations, which are detailed in a "Historical Operational Usage Report" prepared by Grace in April 1983. The depth of the fill material varies as does the distance of fill from the groundwater table. Results of a 1984 investigation of the landfill reported in the "Sampling and Analysis Report for Industrial Landfill" by Camp Dresser & McKee, April 1984 (Landfill S&A Report), found that the filled material was up to 19 feet deep. The distance from the bottom of the landfill to the groundwater table was found to vary between 25 and 35 feet. The volume of fill was estimated to be approximately 70,000 cubic yards, of which perhaps 50 percent is backfilled soil, based on test pit observations. The natural soil which underlies the landfill is made up of mostly fine-medium sand with some coarse sand, small amounts of silt, decomposed rock, and fine gravel, and traces of clay and clay lenses.

The landfill wastes were characterized in the April 1984 Landfill S & A Report. This section summarizes the descriptions in that report, which were based on a test pit program and a groundwater monitoring program. The test pit investigation generally confirmed a "Historical Operational Usage Report" issued by Grace in April 1983. The most abundant material in the landfill test pits was backfilled sand, which appeared to have been mixed with the wastes in all areas. The waste materials, in approximate relative order of abundance, were: coagulum (various types of latices, synthetic rubbers); lagoon sludge; demolition debris; miscellaneous trash (battery separators, rags, cardboard, paper); crushed drums and open containers which originally contained various rubber, oil, and sealing compounds. No closed containers were discovered. The distribution of these waste materials was observed to be very heterogeneous both vertically and horizontally.

The landfill also contains "perched" water in several parts of the landfill in areas where wastes with low permeability such as lagoon sludges hinder infiltration. Above these types of wastes are zones of saturated materials. Areas where the fill is mostly sand and solid refuse are not likely to support perched water. The perched water tables appear discontinuous and are at varying elevations. The volume of perched water varies with rain and was estimated in the Landfill S & A Report to be 700,000 gallons in March 1984. Volatile organic compounds were detected in all perched water samples. The aromatics benzene, toluene, and ethylbenzene are the most prominent compounds throughout the perched water samples. Samples were taken in the unsaturated soil beneath the landfill. Many of the contaminants present in the landfill itself were also detected in the underlying soil.

3. North Lagoon

The North Lagoon is located north of the MBTA railroad tracks. The lagoon received process washwaters similar to those which were sent to the Primary Lagoon and it also received washing waste from the Tank Car Area. The lagoon covers a 26,000 square foot area and contains about 700 cubic yards of sludge which varies from 6 inches to 2 feet in thickness. The underlying soils are primarily fine sands with silt. Groundwater elevation fluctuates above and below the lagoon bottom. Volatile Organic Compound (VOC) contamination was detected along with metals, cyanide and phthalates in sludges and underlying soils. Groundwater in the vicinity of the lagoon has shown contamination.

4. Blowdown Pit

Materials placed in the Blowdown Pit included residues from the venting of uncontrolled chemical reactions. The sludge, which has solidified, has been covered with a layer of soil. The underlying soil is generally fine to medium sand. Depth to groundwater is about 53 feet. The Blowdown Pit contains the most highly contaminated material on the site. Groundwater samples have shown some of the highest VDC concentrations on the site.

5. Boiler Lagoon

The Boiler Lagoon received the annual flushings of phenolic resin from two storage tanks that were adjacent to the battery separator building. The Boiler Lagoon no longer receives discharges from any activities. The underlying soils consist of sand and silt. Depth to groundwater is about 37 feet. The principal contaminants found in the Boiler Lagoon are phthalates and metals, including arsenic. Materials in and under the Boiler Lagoon show lower contamination levels than the other lagoons.

6. Battery Separator Area

The Battery Separator Area consists of three interconnected lagoons (the Battery Separator Lagoons) and a chip pile (the Battery Separator Chip Pile) which is bordering piles of cured paper chips (scraps trimmed from the resin impregnated paper manufactured at the plant). The DEP has determined that the Battery Separator Chip Pile is a solid waste landfill. Until 1977, the Battery Separator Lagoons received drainage from the Cellulose Building. The underlying soils in this area are primarily sands and silts with some gravel. Depth to groundwater is about 37 feet. The principal contaminants found in the Battery Separator Lagoons were ethylbenzene, formaldehyde, VDC, benzene, phenol and some metals.

7. Tank Car Area

The Tank Car Area is located immediately north of the former Organic Chemical Facility, abutting a railroad siding, some of which is paved. The underlying soils consist of fine to coarse sand and gravel. Depth to groundwater is about 45 feet. Between the pavement and the siding lies a concrete drainage trench where wastewater from tank car washings drained to the North Lagoon. Materials deposited in the Tank Car Area consist of the residues from raw materials transported to the plant by train. The groundwater beneath the Tank Car Area is contaminated. Soils in the Tank Car Area are contaminated with VDC, phthalates, and metals.

B. Groundwater

The aquifer over which the Grace property lies consists mainly of glacial deposits of two general types: (1) stratified sands and gravels which readily transmit water and (2) an underlying layer of less pervious glacial till which is a dense and relatively impervious mixture of sand, gravel, clay, silt, cobbles and boulders. The glacial deposits are, in turn, underlaid by bedrock which is weathered and fractured to varying degrees. This bedrock zone is also transmissive. The primary source of groundwater in the aquifers underlying the study area is precipitation. As precipitation enters the ground, it moves downward through the unsaturated glacial deposits to the groundwater table. For the majority of the Grace property, the groundwater table lies from 20 to 50 feet below the ground surface. However, in the vicinity of the North Lagoon, the groundwater table is generally at the ground surface.

There are three general groundwater flow fields under the study area. Groundwater north of a divide roughly defined by Independence Road flows northward toward Fort Pond Brook. Groundwater south of this divide flows southward in two general directions. West of a line roughly defined by the property line between W. R. Grace and the Acton Industrial Park, groundwater flows southwesterly through the Assabet Well Field and the Mass. Broken Stone Pit. East of this line, the groundwater flows southeasterly to the Assabet River. Under natural conditions, groundwater generally flows upward into Fort Pond Brook and the Assabet River.

1. Disposal areas and Groundwater Impacts

Under natural groundwater flow conditions, the Primary Lagoon, Emergency Lagoon and part of the Blowdown Pit lie above the south westerly groundwater flow field. The volatile organic contaminants from these waste sites have contaminated the groundwater including Assabet Wells, WRG-3 and the Massachusetts Broken Stone Pit. The Blowdown Pit, under natural groundwater flow conditions, sits above the groundwater divide. Therefore, a portion of the contamination from the Blowdown Pit also flowed to the north toward Fort Pond Brook. The Secondary Lagoon has created a broad contaminant plume ranging from the eastern edge of the Mass. Broken Stone Pit to the area east of the Landfill. Furthermore, the Secondary Lagoon may have contaminated the groundwater to the northeast. The Landfill plume flows southeastward to the Assabet River. Plumes that might be emanating from the Battery Separator Area, the Boiler Lagoon, the Tank Car Area or the North Lagoon are being mixed with the plume from the Blowdown Pit. Groundwater under these four waste units flows toward Fort Pond Brook.

VI. SUMMARY OF SITE RISKS

A Risk Analysis was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site. A complete discussion of site risks can be found in the Risk Analysis prepared by EPA, dated June 30, 1989. From this analysis, it is apparent that the Grace property in the absence of remediation is likely to pose significant carcinogenic and noncarcinogenic risks to human health in the event that the property is developed and used for residential purposes.

A. General Methodology

Twenty three indicator chemicals (8 for surface material such as soils and sludges, and 15 for groundwater), listed in Table 1, were selected for evaluation in the Risk Analysis. These contaminants constitute a representative subset of the

Table 1 - List of Indicator Chemicals

GROUNDWATER	SURFACE MATERIAL
Vinyl Chloride	Vinyl Chloride
Vinylidene Chloride	Vinylidene Chloride
Benzene	Benzene
Toluene	Toluene
Trichloroethene	Ethylbenzene
Ethylbenzene	Formaldehyde
Formaldehyde	Arsenic
Arsenic	Cadmium
Beryllium	
Cadmium	
Chromium	
Copper	
Lead	
Nickel	
Zinc	

contaminants identified at the Site during the investigations. The 23 contaminants were selected to represent potential on site hazards based on toxicity, level of contamination, and mobility and persistence in the environment.

Potential human health effects associated with the contaminants of concern in surface soils and groundwater were estimated quantitatively through the development of several hypothetical exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the site. Two exposure scenarios were evaluated in the risk analysis. The realistic worst-case scenario is based on maximum concentrations of chemicals in each medium, and the most-probable scenario utilizes average contaminant concentrations. Furthermore, three exposure pathways were included in the analysis; they are: ingestion of groundwater, direct contact with surface materials, and incidental ingestion of surface materials. The Grace site is considered to be a single source for the evaluation of exposure to contaminated groundwater; that is, site wide groundwater data was used. Likewise, exposure to surface materials was evaluated collectively across the entire Grace site. Additionally, in order to evaluate the risk associated with individual source areas, an evaluation of exposures to surface materials independently for each source area was conducted. The specific source areas evaluated were the lagoons (primary, secondary, emergency, and north lagoon), the industrial landfill, the blowdown pit, the battery separator area, the boiler lagoon, and the tank car area.

Incremental lifetime cancer risks and a measure of the potential for noncarcinogenic adverse health effects were estimated for the various exposure scenarios. For carcinogenic compounds, risks are estimated by multiplying the estimated exposure dose by the cancer potency factor (CPF) of each contaminant. The product of these two values is an estimate of the incremental cancer risk. For noncarcinogenic compounds, a Hazard Index (HI) value was estimated. This value is a ratio between the estimated exposure dose and the reference dose (Rfd) which represents the amount of toxicant that is unlikely to cause adverse health effects. Generally, if the HI is less than one, the predicted exposure dose is not expected to cause harmful human health effects. If the HI exceeds one, the potential to cause noncarcinogenic human health effects increases to an unacceptable level.

B. Direct Contact with Surface Material

Surface material at Grace varies in composition from one source to another. In the lagoons, the primary surface material is sludge. However, at the landfill and the other disposal areas, the primary surface material is contaminated soils. Therefore, exposure point concentrations for these sources were developed utilizing material which exists at the surface at each source. The exposures to surface materials were evaluated in two independent analyses: site wide exposure and source specific exposure.

Under residential land use conditions, it was assumed that both small children and adult/youths will be subject to exposure via direct contact to surface material and ingestion of surface material. In general, exposure via ingestion of solid material by small children is greater than for adults or older children.

In summary, the risks associated with direct contact with and/or ingestion of surface material throughout the Grace site were less than those from ground water ingestion. Under realistic worst-case conditions, the total lifetime cancer risks were observed to be 3.35×10^{-4} for direct contact and 3.22×10^{-4} for ingestion exposures. The greatest risks were from exposure to VDC, vinyl chloride, and arsenic. The hazard index did not exceed unity for either scenario under realistic worst-case conditions. Exposures to surface materials were also evaluated for the specific source areas at Grace. The cumulative risk from direct contact and ingestion of surface material was found to exceed 10^{-4} for five of the six sources evaluated under realistic worst-case conditions. The highest risk was seen for cumulative lifetime exposures at the landfill (4.61×10^{-4}). It is recognized that there is limited source specific concentration data for some of the specific source areas.

C. Ingestion of Groundwater

The primary risks observed in this analysis were those associated with ingestion of contaminated ground water by a small child and an adult/youth. Under realistic worst-case conditions, the cumulative lifetime risks for ground water ingestion was found to be 2.78×10^{-1}. The greatest risks were associated with VDC, vinyl chloride, and arsenic. For acute noncarcinogenic effects, a cumulative hazard index of 3.99 was observed for adults/youths under realistic worst-case conditions. For small children, the cumulative acute hazard index was 9.31. Moreover, for chronic effects, adult/youths showed a cumulative hazard index of 122 under realistic worst-case conditions, while the cumulative hazard index for small children was 286. The indicator chemicals which contributed most to these indices were vinyl chloride, VDC, arsenic, lead, and zinc.

VII. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA adopted a proposed plan (preferred alternative) for remediation of sources of contamination at the site in August 1989, including:

1) excavation and transportation off-site for incineration of highly contaminated material from the Blowdown Pit;
2) excavation and stabilization of the remaining contents of the Blowdown Pit, as well as the contaminated sludges and soils of the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon;
3) excavation of contaminated soils from the Battery Separator Lagoons, Boiler Lagoon, and Tank Car area;
4) placing both the stabilized and the non-stabilized materials excavated from the site on the existing Industrial Landfill, and covering these materials with an impermeable cap;
5) closing the Battery Separator Chip Pile Area;
6) establishing Soil Cleanup Goals for all waste disposal areas;
7) modifying the Aquifer Restoration System (ARS) to address air stripper emission controls; and
8) establishing compliance monitoring at each disposal area designed to monitor the effectiveness of the proposed remedy.

The remedy selected in this ROD is consistent with the August 1989 Proposed Plan and indicates no significant changes from the preferred alternative.

VIII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Prior to the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), actions taken in response to releases of hazardous substances were conducted in accordance with CERCLA as enacted in 1980 and the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Although EPA proposed revisions on December 21, 1988 to the NCP to reflect SARA, until these revisions are finalized, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA and to the maximum extent practicable, the current NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Response alternatives were developed to be consistent with these Congressional mandates.

The remedial objectives for the site closure program are established to mitigate existing and future threats to public health and the environment by considering the nature and extent of contamination on-site, the potential exposure pathways and the location and sensitivity of potential receptors. The cleanup objectives are listed below.

1. Protect exposure points, where humans or wildlife may be exposed to contaminants, in soil, groundwater, surface water and sediments, during and after site remediation.
2. Prevent the migration of contaminants in groundwater from sources on- site to public drinking water supplies.
3. Protect on- and off-site groundwater from contamination by site contaminants in excess of drinking water quality.
4. Eliminate the potential for contact in the future with waste materials by the public and the environment.
5. Protect on- and off-site surface water from contamination by site contaminants.
6. Prevent the migration of contaminated run-off from the waste sites.
7. Protect against direct contact with site contaminants and minimize environmental exposure during remedial activities.
8. Reduce to the maximum extent practicable the number of source areas to eliminate long-term management and permit unrestricted use.

B. Technology and Alternative Development and Screening

CERCLA, the NCP, and EPA guidance documents including, "Guidance on Feasibility Studies Under CERCLA" dated June 1985, the "Interim Guidance on Superfund Selection of Remedy" [EPA Office of Solid Waste and Emergency Response (OSWER)], Directive No. 9355.0-19 (December 24, 1986), and the Interim Final "Guidance for Conducting RIs and FSs under CERCLA," OSWER Directive No. 9355.3-01, set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and guidance documents, and consistent with the Consent Decree, a range of treatment alternatives were developed for the Site, a containment option involving little or no treatment, and a no-action alternative.

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. In addition to these factors and the other statutory directives of Section 121, the evaluation and selection process was guided by the EPA document "Additional Interim Guidance for FY '87 Records of Decision" dated July 24, 1987. This document provides direction on the consideration of SARA cleanup standards and sets forth nine factors that EPA should consider in its evaluation and selection of remedial actions. The nine factors are:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
2. Long-term Effectiveness and Permanence.
3. Reduction of Toxicity, Mobility or Volume.
4. Short-term Effectiveness.
5. Implementability.
6. Community Acceptance.
7. State Acceptance.
8. Cost.
9. Overall Protection of Human Health and the Environment.

Sections six and seven of the Phase IV Report identified, assessed and screened technologies based on effectiveness, implementability, and cost. These technologies were combined into contaminant source control alternatives. Section seven in the Phase IV Report presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories required by OSWER Directive No. 9355.0-19. Each alternative was also evaluated by the nine evaluation criteria in Section seven and summarized in Table 7.9-1 of the Phase IV Report. In summary, six remedial alternatives were developed and retained for detailed analysis. Table 2 identifies these six alternatives.

Table 2 - Alternatives Retained for Detailed Analysis

Minimal No Action	
Capping in Place	Alternative 1
Stabilization and Combined Closure on the Landfill	Alternative 2
Excavation and On-Site Encapsulation	Alternative 3
Partial Excavation and either (a) On-Site Incineration or (b) Off-Site Incineration	Alternative 4
Complete Excavation and Incineration either (a) On-Site or (b) Off-Site.	

IX. DESCRIPTION/SUMMARY OF THE DETAILED AND COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a narrative summary and brief evaluation of each alternative according to the evaluation criteria described above.

A. Source Control Alternatives Analyzed

The source control alternatives analyzed for the site include a minimal no action alternative; Capping in Place; Stabilization and Combined Closure on the Landfill; Excavation and On-Site Encapsulation; Partial Excavation and either (a) On-Site Incineration or (b) Off-Site Incineration; Complete Excavation and Incineration either (a) On-Site or (b) Off-Site.

Minimal No Action

Analysis of the No Action alternative is required by federal law and is included for comparison with other alternatives. In this alternative, site conditions would remain unchanged and the ARS would continue to remain in operation on the site. The no action alternative would not achieve any of the remedial objectives. This alternative would not be protective of public health or the environment because it would not reduce existing risks from contact with soils and would permit continued leaching of source contaminants to groundwater. Additionally, this alternative would cause no reduction in mobility, toxicity or volume of the source contaminants present on-site. For these reasons, a no action alternative would not be effective in the short- or long-term in providing a permanent remedy. Since no action would permit continued migration of contaminants at levels above drinking water standards, this alternative would not comply with ARARs for drinking water. The ARS would be required to continue operations into the foreseeable future, and the sources and groundwater would require long-term monitoring. No action would not permanently address site contamination and would be unacceptable to the community.

Estimated Period of Operation: 100 years
Estimated Operation and Maintenance Cost: $200,000
Estimated Total Cost: $2,000,000

Alternative 1
Capping in Place

In this alternative, the Primary, Secondary, and Emergency Lagoons; Industrial Landfill; and the Blowdown Pit would be capped in place. With the exception of the excavation of approximately 20 cubic yards of contaminated materials for off-site incineration, no other excavation would occur and each of these waste disposal areas would be covered with impermeable caps. The construction of these caps would be generally the same as is described under the selected remedy for the Industrial Landfill (Section X.A.3.e). Each of the areas to be capped would first be graded to ensure that clean run-off would drain off of the caps. The North and Boiler Lagoons, the Battery Separator Area, and the Battery Separator Chip Pile would be covered with clean fill and seeded to control erosion. The pavement covering the Tank Car Area would be drilled with a series of holes to encourage movement of rainfall through the covered soils and accelerate leaching out site area contaminants that would be captured and treated by the ARS. The Industrial Landfill would be closed and covered with a cap.

This alternative would use readily available technologies and services and would be easy to implement. Capping would achieve a short-term reduction in public health risks by preventing the potential for direct contact with wastes. However, there would be no reduction of risks associated with the migration of contaminants into the aquifer from wastes disposed of in the other waste areas. Caps would reduce the mobility of the contaminants migrating into the groundwater from the Primary, Secondary and Emergency Lagoons, and the Industrial Landfill, but would not restrict the mobility, toxicity or volume of wastes at the Other Waste Areas. While groundwater contamination levels would recede over time, the protectiveness of this alternative would be dependent upon the use of the ARS to attain drinking water quality. Groundwater in the aquifer would not meet drinking water ARARs and this alternative would not achieve the remedial objective of restoring the aquifer in the shortest practical period of time. In addition, this alternative would not meet certain federal and state requirements for closure of landfills. Another remedial objective that would not be attained is that the number of source areas would not be reduced. Thus, this alternative would require long-term management, monitoring and maintenance, and the potential exists for replacement costs if any of the individual caps at the ten source areas were to fail. Finally, representatives of Massachusetts and the community have already indicated that this alternative would not be an acceptable remedial action.

Estimated Time for Construction: 1 year
Estimated Capital Costs: $3,270,000
Estimated Operation & Maintenance Costs:$1,228,000
Estimated Total Costs: $5,048,000

Alternative 2
Stabilization and Combined Closure on the Landfill

Alternative 2 would excavate and solidify sludges and soils from the lagoons, stabilize the excavated materials, place the solidified mass on the industrial landfill, and construct an impermeable cap on the landfill. Other waste areas would be covered and monitored. This alternative was recommended by Grace in the August 1988 Phase IV Report as the cleanup and remedial measure for addressing site contamination. Subsequent amendments to Alternative 2, as submitted by Grace in their June 6, 1989 Addendum, provided for the additional excavation of waste materials from all of the disposal areas to attain soil cleanup levels, and included plans for another groundwater extraction well for contaminants migrating from the landfill.

This alternative, as modified by additional requirements for soil cleanup levels, compliance monitoring, air emission controls, and closure of the solid waste chip pile, has been chosen as the selected remedy for the Site and is described in detail in Section X.

Alternative 3
Excavation and On-Site Encapsulation

In this alternative, waste materials and two feet of soil would be excavated from the Primary, Secondary and Emergency Lagoons, as well as from the Blowdown Pit (twenty cubic yards from the Blowdown Pit would be excavated for off-site incineration). The excavated material would be consolidated in an encapsulation system that would be constructed on top of the Industrial Landfill. The encapsulation system would consist of a cap to prevent rainwater from coming in contact with the wastes combined with a leachate collection system that would prevent any waste materials from migrating into the groundwater. Any leachate captured by the collection system would be treated using the air stripping tower that is part of the ARS. The encapsulation system would cover approximately 50 percent of the Landfill surface. The remaining 50 percent of the Landfill would be covered with an impermeable cap. The Boiler Lagoon, Battery Separator Area, Battery Separator Chip Pile, and the North Lagoon would be covered with clean fill and seeded. The pavement covering the Tank Car Area would be drilled with a series of holes to encourage movement of rainfall through the covered soils and to accelerate leaching out site area contaminants that would be captured and treated by the ARS.

This alternative would be implemented using available technologies and services and would be effective in containing contaminants excavated from the disposal areas. Alternative 3 would reduce the mobility of much of the contaminants on-site; however, this reduction in mobility would not be achieved for contaminants in the Boiler Lagoon, Battery Separator Area, Battery Separator Chip Pile, and the North Lagoon source areas. This alternative would not reduce the toxicity or volume of contaminants (with the exception of the materials from the Blowdown Pit that would be incinerated off-site). Alternative 3 would not protect groundwater from the migration of residual contamination remaining in the excavated and unexcavated areas. The protectiveness and long-term effectiveness of this alternative would be dependent upon the use of the ARS to treat contaminated groundwater prior to use as drinking water. Thus, this alternative would not achieve the remedial objective of restoring the aquifer in the shortest practical period of time. Also, this alternative would not achieve drinking water ARARs in groundwater at the Site. In addition, this alternative would not reduce the number of contaminant source areas, requiring long-term monitoring and maintenance to watch for and correct any failure in the encapsulation system.

Estimated Time for Construction: 2.5 years
Estimated Capital Costs: $4,117,000
Estimated Operation & Maintenance Costs: $1,752,000
Estimated Total Costs: $5,869,000

Alternative 4
Partial Excavation and (a) On-Site Incineration
Partial Excavation and (b) Off-Site Incineration

Alternative 4 would excavate sludges and two feet of underlying soil from the Primary, Secondary and Emergency Lagoons and the Blowdown Pit. The excavated material would be incinerated at either a transportable hazardous waste incinerator that would be assembled on-site or at an off-site incinerator. The Boiler Lagoon, Battery Separator Area, Battery Separator Chip Pile, and the North Lagoon would be covered with clean fill and seeded. The surfaces of the excavated lagoons and Blowdown Pit would also be covered with clean soil. The pavement covering the Tank Car Area would be drilled with a series of holes to encourage movement of rainfall through the covered soils to leach out site area contaminants for capture and treatment by the ARS. The Industrial Landfill would be closed and covered with a cap.

In Alternative 4(a), in which the incinerator would be operated on-site, ash resulting from the incineration process would be placed on the Industrial Landfill. The landfill would be closed and covered with an impermeable cap. In Alternative 4(b), the contaminated materials and soil would be transported off-site in specially designed water-tight trucks to a licensed hazardous waste incinerator in compliance with all applicable state and federal requirements and in compliance with the EPA's off-site policy. Air pollution controls would be utilized to prevent any release of contaminants during the incineration process.

Incineration is a proven technology and would permanently destroy most of the site contaminants excavated from the Primary, Secondary and Emergency Lagoons and the Blowdown Pit. Incineration would not destroy metals that may be present in the site contaminants, however, and could increase the concentration of metals in the resulting incinerator ash. The mobility and toxicity of remaining site contaminants would not be reduced, but incineration would achieve some reduction in volume. This alternative would not address residual contamination left in each source area after excavation and would leave an undetermined amount of waste in-place in the landfill and Other Waste Areas with only a soil cover. Therefore, it would permit continued migration of contaminants from the source areas into the groundwater at levels exceeding drinking water standards. Because this alternative would not expedite restoration of the aquifer, it would not be protective of public health or the environment and the long-term and overall effectiveness of this alternative would be dependent upon the use of the ARS to protect groundwater quality. On-site incineration would be implementable, although test burns would be necessary to establish performance parameters and engineering controls would be necessary to protect worker health and safety during cleanup activities. Off-site incineration may be difficult to implement due to the limited number of existing commercially operated incinerators licensed to accept wastes of the type found at the W. R. Grace site and the problems associated with handling and transporting large amounts of contaminated soils and sludges. Limited availability would increase the time necessary to complete the remedial action, which means this alternative would not be effective in the short-term in achieving the remedial objectives. Furthermore, transportation and incineration of large volumes of wastes would be expensive and would pose controllable short-term risks along the route to the incineration facility.

Estimated Time for Construction: 5 years
Estimated Capital Costs:
    On-Site: $10,862,000
    Off-Site: $69,806,000
Estimated Operation & Maintenance Costs:
    On-Site: $1,752,000
    Off-Site: $1,752,000
Estimated Total Costs:
    On-Site: $12,614,000
    Off-Site: $71,558,000

Complete Incineration on-site , off-site

This alternative would involve the excavation and incineration of contaminated sludges and soils in all of the source areas, except from the Tank Car Area. The Industrial Landfill and an additional two feet of soil underlying each area would be excavated and incinerated from each waste disposal area. Costs for incineration were evaluated for operation of both an on-site incinerator and for trucking all wastes to an off-site incinerator. On-site incinerator ash would be placed in a secure landfill that would be constructed on-site.

This alternative would be protective of public health and environment over the long-term. The mobility, volume and toxicity of site contaminants would be permanently reduced. This alternative would meet all the remedial objectives for the site and it is anticipated that this alternative, if properly implemented, would attain ARARs. Incineration of all contaminated material in the source areas, and especially the landfill, would pose substantial implementation problems. First, the excavation of the landfill and materials storage and handling would present the threat of contaminant release in air emissions over several years. The potential for releases is increased for off-site incineration, since the waste materials would have to be prepared for shipment. Strict process, safety and engineering controls would be necessary to protect site workers and public health and the environment during excavation, waste storage and handling, and incineration activities. Incineration of the various types of waste materials that have been found in the landfill may require utilization of more than one incineration technology and subsequent disposal of various types of waste residuals. In addition, delays in implementation due to the limited availability of licensed incinerators, together with the potential need to utilize more than one technology, indicate that this alternative would not provide short-term effectiveness. Finally, the off-site incineration alternative would require extensive truck or rail traffic, which would have to move through the Town of Acton and would pose potential risks of accidental releases and exposures over the duration of the remedial program at the site.

Estimated Period of Operation: 4 - 8 years
Estimated Operation and Maintenance Costs:
    Off-site: $1,728,000
    On-site: $1,728,000
Estimated Total Cost:
    On-site: $105,031,000
    Off-site: $472,223,000

X. THE SELECTED REMEDY

The selected remedy is an operable unit that will address source areas on site. As described in Section IV, Scope and Role of Operable Unit or Response Action, this operable unit is a integral portion of the overall site remedy.

A. Description of the Selected Remedy

1. Remedial Action Objectives

The selected remedy was developed to satisfy the following remedial objectives which will guide the design of the remedy and be used to measure the success of the remedy.

a. Waste Disposal Areas

Eliminate the risks from human contact in the future with waste materials in the Lagoons (Primary, Secondary, Emergency, and North); Industrial Landfill; Blowdown Pit; and, Other Waste Areas (Battery Separator Lagoons, Battery Separator Chip Pile, Boiler Lagoon, and Tank Car Area) by attaining the Soil Cleanup Goals established for each indicated area.

Protect site workers from exposure to contaminants during all phases of the remedial activities.

Reduce the number of waste disposal areas which require long-term management by consolidating, containing, and monitoring the waste material in a protective manner.

Minimize environmental releases to the maximum extent practicable during excavation of the waste disposal areas, while transporting the excavated material to the VFL staging area or to the landfill, while conducting the VFL process, while transporting stabilized material from the VFL staging area to the landfill, while placing the waste material on the landfill, or during any other phases of the remedial action.

Protect on- and off-site surface water from contamination by site contaminants.

Prevent the migration of contaminated run-off from any of the waste disposal areas.

b. Groundwater

Protect current exposure points from contaminated groundwater during and after site remediation.

Protect on- and off-site groundwater from contamination by disposal areas.

Expedite restoration of groundwater to drinking water quality in the shortest practical period of time.

2. Soil Cleanup Goals

To meet these objectives, EPA has established Soil Cleanup Goals that would be protective of public health and the environment. The term Soil Cleanup Goals is intended to refer to indicator compounds or any other compounds that EPA and DEP determine are not adequately addressed by the currently selected indicator compounds. Attaining the cleanup levels is expected to reduce the level of contamination in the source areas so that any further migration of contaminants into the groundwater will not exceed drinking water quality under the source area. Achieving these Soil Cleanup Goals will expedite restoration of the aquifer under the site to drinking water quality. Additionally, attaining these goals will mitigate the threat posed by direct contact to site contaminants.

Soil Cleanup Goals are established for five indicator compounds which have been selected to represent the chemical contamination in the waste disposal areas. They are: VDC, vinyl chloride, ethylbenzene, benzene, and bis (2-ethylhexyl) phthalate. It is expected that the attainment of the cleanup levels for these compounds will reduce residual contamination of other compounds found in the disposal areas to such low levels as to present no significant risk from direct contact or from migration of contaminants to the groundwater. The Soil Cleanup Goals for this remedy also include other compounds that are identified at any time in the underlying soils at levels that, through direct contact of if allowed to leach into groundwater, would exceed federal or state drinking water quality or exceed state groundwater quality, or would present a carcinogenic risk of 1 x 10^{-6}.

The Soil Cleanup Goals were generated by EPA using a model developed by W. R. Grace and their consultants. The model and the calculations for establishing the Soil Cleanup Goals are described in Appendix A to this ROD. The EPA and DEP have reviewed this model and believe that it is a reasonable tool for developing appropriate Soil Cleanup Goals. The model calculates the levels of the indicator compounds which, if left in each disposal area as a residual, would not lead to further contamination of groundwater at levels that exceed drinking water standards. To the extent that Maximum Contaminant Levels (MCLs) have been established under the federal and state drinking water statutes for Site contaminants, the model has calculated the Soil Cleanup Goals to ensure that groundwater passing under the residual contamination is not degraded by those waste residuals to levels that would exceed the promulgated drinking water or groundwater quality standards. Specifically, the Soil Cleanup

Goals for the following substances were established to attain the following MCLs: VDC of 7 ppb, vinyl chloride of 2 ppb, benzene of 5 ppb; the following proposed MCL: ethylbenzene of 700 ppb; and the following risk based level: bis (2-ethylhexyl) phthalate of 2 ppb.

As noted previously, the Soil Cleanup Goals of this remedy are protective of public health and are intended to facilitate the restoration of the groundwater at the site. Attaining the Soil Cleanup Goals of this remedy will not in itself result in the immediate attainment of MCLs in groundwater at the Site. Contamination that has already migrated into the groundwater will still remain. Therefore, groundwater that passes under a remediated source area may contain contaminants exceeding the drinking water standards used for the Soil Cleanup Goals. However, this remedy will reduce any additional contamination from the migration of residuals so any future leachate from the sources will not contaminate the groundwater above drinking water quality. If site monitoring after the implementation of the selected remedial action indicates that conditions are not as predicted by the model, additional actions would be conducted to assure protection of human health and the environment. Table 3 lists the Soil Cleanup Goals for this remedy.

3. Description of Remedial Components

The selected alternative addresses each of the following waste disposal areas: Lagoons (Primary, Secondary, Emergency, and North); Industrial Landfill; Blowdown Pit; and, Other Waste Areas (Battery Separator Lagoons, Battery Separator Chip Pile, Boiler Lagoon, and Tank Car Area). The individual components of the selected alternative are described below.

a. Excavation and Stabilization of wastes in the Lagoons and the Blowdown Pit and Placement of Treated Wastes on the Industrial Landfill

Waste materials in the Primary, Secondary and Emergency lagoons, including sludges and contaminated soils, will be excavated using conventional construction equipment, such as backhoes. The excavated contents will be treated on-site by stabilization using the VFL process. Sludges and at least two feet of soil underlying the sludges in the disposal areas will be excavated and stabilized, thereby eliminating the majority of the continuing source of groundwater contamination. Following stabilization, the treated materials will be placed on top of the Industrial Landfill, which will then be covered with an impermeable cap.

All excavation and stabilization activities will be performed using best engineering practices to minimize release of compounds to the ambient air or underlying soils.

Table 3 - Soil Cleanup Goals

SOIL CLEANUP GOALS
concentrations in parts per billion (ppb)

	VDC	VINYL CHLORIDE	ETHYL BENZENE	BENZENE	BIS-2 ETHYL HEXYL PHTHALAT
PRIMARY LAGOON	17	19	1277	2	128
SECONDARY LAGOON	65	75	4914	7	491
EMERGENCY LAGOON	8	9	619	1	61
BLOWDOWN PIT	15	17	1122	2	112
BOILER LAGOON	23	26	1741	3	174
BATTERY SEPARATOR LAGOONS	15	18	1161	2	116
TANK CAR AREA	17	19	1277	2	128

Sediments from the North Lagoon will be removed, at a minimum, to a depth equivalent to the low groundwater level so that there will not exist a zone of residual contamination above the groundwater table that will re-contaminate groundwater and require additional remedial work. Because of the location of the North Lagoon, excavated materials from this area will be pumped to the stabilization area as a slurry under the railroad bed with equipment similar to that used to pump concrete. All of the sludge and sludge contaminated sand above the low groundwater level will be removed from the North Lagoon. The excavated materials will then be transported to the stabilization unit in equipment that will prevent releases of contamination during transportation.

Materials in the Blowdown Pit containing greater than 100 parts per million (ppm) of VDC will be excavated and shipped to an off-site hazardous waste incinerator for treatment. The remaining sludge and contaminated materials in the Blowdown Pit disposal area and at least two feet of underlying soil will be excavated and stabilized in the same manner as the lagoon area contaminants. The stabilized material will also be placed on the Industrial Landfill prior to construction of the cap. Prior to any excavation activities at the Blowdown Pit, this disposal area will be sampled in order to define the approximate volume and area likely to be contaminated in excess of 100 ppm of VDC.

A sludge stabilization process developed by the VFL Technology Corporation has been proposed by Grace and determined by EPA and DEP to be an effective method at the pilot scale level for minimizing the migration, or leaching, of site contaminants after placement of the wastes on the Industrial Landfill. The VFL process consists of excavating the contaminated soils and sludges and mixing them with quicklime, flyash, and portland cement. Pilot-scale tests of the VFL process were conducted at the W. R. Grace site in the spring and summer of 1984. These tests were designed to determine the most effective procedures for stabilizing the type of sludges and contaminants found at the W. R. Grace site. Mixing of the sludges with flyash and lime results in the production of a material with the consistency of soil. The material physically contains site contaminants and absorbs any liquids that might be present in the contaminated materials. The addition of portland cement creates a more solid and stable material, increasing its suitability for placement upon the Industrial Landfill prior to construction of the cap. Excavation of the disposal areas and application of the VFL process will be implemented sequentially lagoon by lagoon so as to complete the stabilization from one lagoon before moving on to the next lagoon. The total mixing of all wastes from a particular lagoon with VFL materials will be done in batches. The various materials will be metered from live bottom hoppers or silos onto a moving belt that will convey them to a mixer. The mixer will be enclosed and vented to an emission control system which uses BACT, probably activated carbon, to prevent emissions to the ambient air during this process step. The completed mix will be transported to its final location at the landfill after it demonstrates that it meets predetermined mixer specifications. There will be separate mixtures used for the sludge, soil, and combination of sludge and soil. Mixtures that were successfully used for the pilot project will be used, and additional mixtures may be pilot tested during design of the remedy. Periodic testing for waste constituents at various stages of the stabilization process will be conducted. It is estimated that the solidification and placement on the landfill of all the wastes from the lagoons will take 4-5 months. Approximately 350 truckloads of raw materials to be used in the VFL process will be transported to the site at a rate of approximately 3 trucks per day. During implementation of the remedy, measures to minimize the impact of transporting this volume of material to the site will be implemented.

b. Other Waste Areas

In order to attain the Soil Cleanup Goals established for the other waste areas; to consolidate as much source material from the site on the landfill as practical; and to provide the fill needed to construct the appropriate Landfill cap; the contents of the Battery Separator Lagoons, the Boiler Lagoon, and the Tank Car Area will be excavated to a depth of at least five feet. These materials will be placed on the Landfill above the stabilized materials to create a surface grade suitable for cap construction. Although Site investigations indicate that the waste materials from these areas contain low levels of contaminants that would not require stabilization prior to placement under the cap, the contaminant levels of all excavated materials from this area will be analyzed prior to placement on the Landfill. Should the analytical results show that a portion of excavated materials is contaminated at unexpected levels that indicate the unstabilized materials may present implementation problems or impact on the effectiveness or protectiveness of the landfill remedy, then those materials would be stabilized prior to placement on the landfill or would be disposed off-site. If post-excavation sampling and analysis indicate Soil Cleanup Goals have not been attained, other actions under OU 3 would be taken similar to those described for the Secondary Lagoon, Emergency Lagoon and Blowdown Pit.

c. Post Excavation Analysis

Immediately following completion of the remedial actions to excavate sludges and soils from each waste disposal area (not including the Industrial Landfill and the Battery Separator Chip Pile), comprehensive horizontal and vertical sampling of soils will be performed to characterize residual contaminants at the disposal areas. The soils will be analyzed for all priority pollutants plus the five highest non-priority peaks and metals. The analytical results will be evaluated to determine whether contamination is present at concentrations equal to or less than the Soil Cleanup Goals. The post excavation sampling and analysis program for a disposal area will be initiated within 30 days after completing the excavation of sludges, soils or sediments from that disposal area, and the evaluation of the results will be completed as soon as possible.

If the evaluation indicates that the areas have residual contamination equal to or below the Soil Cleanup Goals as specified in Section X.A.2, the excavated area will be graded, covered with a minimum of six inches of clean top soil and seeded or vegetated as necessary to establish and support growth to control erosion.

If the evaluation indicates that the areas have residual contamination at levels that exceed the Soil Cleanup Goals, then the following actions will be taken.

For disposal areas where the Soil Cleanup Goals are not attained, interim measures will be taken at each disposal area as soon as possible to minimize the infiltration of surface water and migration of contaminants into the residual soils for the period immediately following excavation of each disposal area until a remedy is selected under OU Two, as described below.

If residual contamination found in the Primary Lagoon exceeds the cleanup goals set for the Primary Lagoon, an additional remedial step, flushing, will be considered. This additional remedial step is potentially feasible because of the close proximity of the Primary Lagoon to the ARS extraction wells currently being operated by Grace on the site. The decision to use this additional remedial step will be based on the type and concentration of contaminants identified. This additional step will consist of flushing clean water through the excavated Primary Lagoon and capturing this water (now containing the residual contamination) using two existing extraction wells, SLGP and SLBR, of the ARS. The effectiveness of the soil flushing will be monitored and evaluated for two months. If flushing does not prove to be effective in this period, actions will be taken similar to those taken at the other disposal areas as described below, and will include determining the nature and extent of contamination and evaluating remedial options.

If the Soil Cleanup Goals set for any of the disposal areas, including the Secondary Lagoon, Emergency Lagoon, Blowdown Pit, Boiler Lagoon, Battery Separator Lagoons or Tank Car Area, have not been attained following excavation of sludges and underlying soils, OU Two will be implemented. Using the results of the post excavation sampling, an evaluation of remedial alternatives will be conducted for each disposal area to determine the most appropriate remedial technology to apply to attain the Soil Cleanup Goals. The nature and extent of contamination as well as the criteria used in selecting the remedy in this ROD will be considered in selecting remedial measures that will attain the Soil Cleanup Goals. Alternatives that will be considered include, but will not be limited to, additional soil removal (possibly requiring solidification), and vacuum extraction. As mentioned previously, the selection of any additional remedial measures will be subject to the same remedial decision procedures as the selection of this alternative and will be selected in a supplemental ROD.

d. Battery Separator Chip Pile

The Battery Separator Chip Pile will be closed as a solid waste landfill in accordance with Massachusetts Regulations in 310 CMR 19.00. These regulations require, among other things, capping the disposal area with an impervious material. The final cap over the Battery Separator Chip Pile will consist of a minimum of twelve inches of impervious final cover material with a coefficient of permeability of less than or equal to 1×10^{-7} centimeters per second, or a synthetic equivalent, overlain by at least a six inch minimum thickness of drainage blanket layer of sand, and a top layer of at least six inches of loam that will support vegetation. The final cap will be graded so that surface water will not accumulate and will be at a slope greater than three percent.

e. Industrial Landfill

The Landfill will be covered with the stabilized materials from the lagoons and Blowdown Pit and then graded using excavated materials from the other waste disposal areas. The Landfill will then be sealed, or closed, with an impermeable cap designed and constructed in accordance with Massachusetts Hazardous Waste Regulations for landfills specified at 310 CMR 30.580-595 and 30.620-633, as well as any other ARARs (see Section XI.B).

The impermeable cap will include a synthetic cover to prevent infiltration of surface water (e.g., rain or snow melt waters) into the waste materials beneath the cap. By preventing water from coming into contact with contaminated materials, the cap will prevent contamination from migrating into groundwater. In addition, construction of the cap will prevent direct human and environmental exposure to the excavated site contaminants and the contents of the Landfill.

During design of the landfill closure, an evaluation of the feasibility of monitoring the unsaturated soils below the bottom of the landfill will be conducted. The intent of this monitoring is to determine as soon as possible if a failure of any sort in the cap has permitted the generation of landfill leachate. To the extent that this monitoring is found to be feasible, implementable, and effective, it will be conducted.

Field survey control will be established at various points on the landfill before any disposal activities on the landfill for use in designing placement of materials and establishing the boundaries of the landfill.

Additionally, during the design of the landfill closure, an engineering analyses will be conducted to determine the potential for differential settlement of the landfill. If the results of the engineering analyses indicate the likelihood of differential settlement that may affect the long term integrity of the cap, deep dynamic densification or consolidation of the landfill will be evaluated as a pre-construction activity to mitigate the adverse impacts of unpredictable settlement on the integrity of the cap.

After survey data show that primary consolidation has occurred, it is estimated that this may take 6 months to a year to occur, the subgrade will be adjusted with additional common fill, if necessary, and the final cap will be constructed. Liquids released to groundwater during consolidation will be captured and treated by the Industrial Landfill Groundwater Recovery System. After the final cap is installed, survey control points will be reestablished.

Interim measures will be taken as soon as possible at the landfill during the consolidation period to minimize the infiltration of surface water into, and surface water run off from, the exposed landfill.

The landfill cap will be operated and maintained in accordance with the requirements of 310 CMR 30.620-633. Groundwater and survey monitoring will continue after closure for as long as necessary to provide the protective remedy designed by this ROD. The cap will be repaired as necessary, including total or partial replacement if necessary. This remedy will include the preparation of a landfill operation and maintenance plan that will specify measures for ensuring the integrity of the cap and for taking actions to investigate the need for repairs. A degradation of groundwater quality downgradient of the landfill or subsidence of the landfill cap or other indicators will be used to evaluate the integrity of the cap. Zones of subsidence, as defined by the survey control points, may indicate where repairs are necessary. Cap repairs will be conducted as soon as possible.

A groundwater monitoring and recovery system will be designed and installed at the Industrial Landfill to supplement the existing ARS recovery wells. The Industrial Landfill Groundwater Recovery

System will be constructed as close as possible to the landfill boundary to contain and collect any contamination migrating from the Landfill. The existing eastern landfill recovery well (ELF) may also be used as a component of this system. This system will be installed and in operation prior to any remedial activities at the Landfill. Sufficient monitoring wells will be installed, to the extent that they do not already exist, to accurately identify the conditions on all sides of the landfill and to monitor groundwater on all sides of the landfill.

The cap will be constructed with vents through the Landfill cap to allow gases from the existing landfilled material or newly placed material to vent to the surface outside the Landfill. These vents will be distributed over the entire area of the landfill. Vents placed in the existing Landfill material will go directly to the surface and will not be vented under the High Density Polyethene (HDPE) membrane. A soil gas analysis will be conducted over the landfill during design to determine appropriate venting locations. To attain Massachusetts ARARs found in Massachusetts Regulations 310 CMR 19.00 (Solid Waste Regulations) and in 310 CMR 7.00 (Air Quality Control Regulations), emissions from the Industrial Landfill vents will be controlled utilizing best available control technology (BACT). It is anticipated that BACT will eliminate any discharge of contaminants to the ambient air. The gas control system will be designed such that all vents can be combined into a common single discharge point. Testing of the emissions discharged through the venting system after complete installation of the cap will determine the type of technology needed for control of the emissions. The vents will also be used to monitor and evaluate the integrity of the cap over time.

f. Upgrading the ARS Air Stripper Tower

In accordance with Massachusetts Air Quality Control Regulations in 310 CMR 7.00, the ARS air stripping tower will be upgraded by installing Best Available Control Technology (BACT). It is anticipated that BACT will be carbon adsorption to control contaminant levels in air emissions from the groundwater treatment facility. This requirement is being imposed on new air strippers and any existing units that are modified or found to cause an odor. If additional controls or changes in operations are needed to address odors, they will be required.

g. Groundwater Monitoring

A comprehensive groundwater monitoring plan will be implemented to evaluate the effectiveness of the selected remedy. This groundwater monitoring plan will be developed during the design of the remedial action. Performance monitoring will be implemented consistent with 310 CMR 30.660-675, including 310 CMR 30.672(4). Groundwater monitoring compliance wells will be installed at all disposal areas prior to any remediation activities at the site. They will be located in order to monitor groundwater in each disposal area in a manner that ensures a comprehensive horizontal and vertical delineation of groundwater quality upgradient and downgradient of each disposal area. Comprehensive sampling and analysis of these wells would be performed prior to initiation of any remedial action. Additionally, these wells would be sampled during the remedial action and at appropriate frequencies after the completion of the remedial action to ensure source control measures have been effective.

h. Review of the Remedy

In addition to the reviews planned as part of the remedy to review the effectiveness of OU One in attaining the remedial objectives, EPA plans to conduct other reviews of the Site. Since hazardous substances, pollutants or contaminants will remain at the Site following completion of this operable unit, EPA will review the Site at least once every five years after the initiation of remedial action at the site to assure that the remedial action continues to protect human health and the environment, in accordance with Section 121(c) of CERCLA. EPA will also evaluate risk posed by the Site at the completion of the remedial action (i.e. before the Site is proposed for deletion from the NPL).

B. Rationale for Selection

The rationale for choosing the selected alternative is based on the assessment of each criteria listed in the evaluation of alternatives section of this document. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs unless a waiver is granted. In assessing the alternatives that met these statutory requirements, EPA focused on the other evaluation criteria, including, short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and cost, EPA also considered nontechnical factors that affect the implementability of a remedy, such as state and community acceptance. Based upon this assessment, taking into account the statutory preferences of CERCLA, EPA selected the remedial approach for the Site.

The selected remedy provides the best combination of measures to address the contaminated areas. The selected alternative will provide overall protectiveness of human health and the environment. Potential contact with site contaminants by the public would be eliminated. The selected alternative will reduce the number of disposal areas that are the sources of continuing groundwater contamination to promote a more timely cleanup of groundwater. The waste sludges and contaminated soils will be treated and then consolidated at the landfill where the contaminants can be, monitored, managed and controlled more effectively. The selected alternative will utilize treatment to reduce the mobility, toxicity and volume of contaminants from the Blowdown Pit by incineration and will significantly reduce the mobility of other contaminants as a result of solidification and containment. Engineering controls will be required for short-term protection of site workers during excavation and waste handling operations. The selected alternative will be readily implementable and will attain ARARs. Finally, the selected remedy attains all the response objectives.

Other alternatives evaluated in detail were considered less acceptable. The minimal no action alternative was not selected because it would not be protective of public health or the environment, would not comply with ARARs, and would not achieve the remedial objectives. Furthermore, the no action alternative would not be effective in the short- or long-term in providing a permanent remedy and would not be acceptable to the community.

All of the other action alternatives, except for complete on-site and off-site incineration, are not protective because they would not adequately address the contamination in the Other Waste Areas and would not address residual contamination left behind after the remedial actions are taken. Those alternatives did not include soil cleanup levels, and planned only to remove sludges and two feet of underlying soils they may leave higher levels of contaminants in each of the disposal areas, and would not address contamination in the Other Waste Areas. Therefore, those alternatives would not be as protective of groundwater that would be affected by the migration of residual contamination. Furthermore, the capping in place alternative, the encapsulation alternative, and the partial incineration alternatives would only install a permeable cover over the Boiler Lagoon, Battery Separator Lagoons, Battery Separator Chip Pile, and the North Lagoon source areas, which would permit flushing of residual contaminant into the groundwater for the foreseeable future. Thus, these alternatives would rely solely on the ARS to capture the released contaminants and therefore extend the time period for restoration of the aquifer to drinking water quality.

Consistent with this analysis, the only protective alternatives that were evaluated were the selected remedy and the complete incineration alternatives. Both the on-site and off-site complete incineration alternatives would address all the disposal areas except for the Tank Car Area and thus provide a level of protectiveness similar to the selected alternative. However, the cost of the complete incineration alternatives are not proportionate to the protectiveness provided.

Although the capping in place alternative and the encapsulation alternative reduce the mobility of some of the site contaminants, they do not use treatment as a principal element to attain such reduction. The incineration alternatives would use treatment to reduce the mobility, toxicity and volume of the wastes and provide a permanent reduction of contaminants. However, the incineration alternatives are not cost-effective because their costs are disproportionate to their effectiveness in providing a protective remedy.

Considering the implementability of the alternatives, all the alternatives except the complete incineration alternative are readily implementable. The complete incineration alternative, either on-site or off-site, would take significantly longer to complete than will the selected remedy, and would pose difficult implementation problems. First, the excavation of the landfill would present the threat of contaminant release to groundwater and in air emissions throughout the duration of the project. Strict process engineering and safety controls would be necessary to protect site workers, public health and the environment during excavation, waste handling and storage and incineration activities. Incineration of the various types of waste materials that have been found in the landfill also could require utilization of more than one incineration technology and subsequent disposal of various types of waste residuals. In addition, the off-site incineration alternative would require extensive truck traffic in and through the residential communities surrounding the site.

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the W. R. Grace Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs and is cost effective. The selected remedy also satisfies the statutory preference for a permanent solution to the maximum extent practicable and for treatment which reduces the mobility, toxicity or volume as a principal element. Additionally, the selected remedy utilizes alternate treatment technologies to the maximum extent practicable.

A. The Selected Remedy is Protective of Human Health and the Environment

The selected remedy at this site will attain the remedial objectives and will permanently reduce the risks posed to human health and the environment by exposure to contaminated source areas. The Soil Cleanup Goals have been selected to achieve drinking water standards in groundwater under each disposal area and protect against the potential risks from continued leaching of source area contamination into the groundwater.

Specifically, attaining the Soil Cleanup Goals will reduce the level of contamination in the source areas so that any further migration of contaminants into the groundwater will not cause the groundwater on site to exceed drinking water standards (including MCLs). Achieving these Soil Cleanup Goals will reduce the time necessary for restoration of the aquifer under the site to drinking water quality.

The soil cleanup levels to be attained by this remedy will reduce the risks from direct contact to and incidental ingestion of contaminated soils to a level protective of human health. The cumulative risk, under residential assumptions, associated with direct contact plus ingestion for the four indicator compounds that are carcinogens at the established Soil Cleanup Goals is 8.34×10^{-7}.

The solidification of excavated waste and soil materials and placement on the Industrial Landfill and construction of an impermeable cap over the materials in the landfill will provide a barrier to protect against exposure wastes and contaminated soils by both human and environmental receptors. The combination of solidification, placing on the landfill and capping will significantly reduce the mobility of contaminants in the landfill. Consolidation of the waste materials on the existing landfill and under the landfill cap will reduce the number of potential sources of contamination and allow for more effective monitoring, management, and maintenance of contaminants.

There are two areas on-site where waste will be left in place under a cap which will require long term management. Periodic site inspections and maintenance will be performed to ensure the integrity of the caps, and their effectiveness in preventing exposure to the waste materials which they cover. Safe and protective long term management will be accomplished by proper inspection, monitoring and maintenance of the cap systems.

In addition, EPA plans to conduct periodic reviews of the remedy's effectiveness in attaining the protectiveness established as remedial objectives and in order to ensure that the remedy remains protective. Institutional controls will be implemented to regulate land use of the Industrial Landfill and Battery Separator Battery Separator Chip Pile including activities which may compromise the integrity of the caps. These controls will supplement requirements of the existing Consent Decree, which required Grace to file a notice with the Registry of Deeds and to obtain the consent of the United States before transferring any property at the Site.

B. The Selected Remedy Attains ARARs

This remedy will meet or attain all applicable or relevant and appropriate federal and stricter state requirements that relate to the site. Federal Environmental laws which are applicable or relevant and appropriate to the selected remedial action for this operable unit at the W. R. Grace - Acton Site are:

Clean Water Act (CWA)
Safe Drinking Water Act (SDWA)
Resource Conservation and Recovery Act (RCRA)
Clean Air Act (CAA)
Occupational Safety and Health Administration (OSHA)

State environmental regulations which are applicable or relevant and appropriate to the selected remedial action at the Site are:

Massachusetts Dept. of Environmental Protection (DEP) Regulations

Hazardous Waste Regulations
Drinking Water Regulations
Air Quality Standards
Air Pollution Control Regulations
Groundwater Quality Standards
Solid Waste Regulations
Water Pollution Control Regulations

Table 4 lists the chemical specific ARARs and outlines the action which will be taken to attain the ARARs. Table 5 indicates the action specific ARARs, presents a brief synopsis of the requirements, and outlines the action which will be taken to attain the ARARs. No location-specific ARARs have been identified. A brief narrative summary of the ARARs follows.

1. Chemical Specific

The groundwater at the Site, both on-site and immediately off-site, is a source of drinking water. Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act and Massachusetts Drinking Water Standards, which regulate public drinking water supplies, are applicable to drinking water at the tap and are not applicable to groundwater. However, because the groundwater is used as drinking water source, MCLs are relevant and appropriate. The Massachusetts drinking water standards applicable to this Site are the same as the MCLs. Groundwater at the Site is classified as Class I by Massachusetts, making the Massachusetts Groundwater Quality Standards (MGWQS) listed under 314 CMR 6.07 applicable to the groundwater aquifer. The MGWQSs applicable to this Site are the same as the MCLs. This operable unit will attain these ARARs by meeting the Soil Cleanup Goals for the compounds with promulgated MCLs and MGWQS. By reducing

TABLE 4
CHEMICAL SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE SELECTED REMEDY AT THE
W R GRACE - ACTON SUPERFUND SITE, ACTON, MASSACHUSETTS

ARARs	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
FEDERAL SDWA - Maximum Contaminant Levels (MCLs)(40 CFR 141.11-141.16) Contaminant — MCL Benzene — 5 ppb Vinyl Chloride — 2 ppb VDC — 7 ppb	MCLs have been promulgated or proposed for a number of common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, and may be relevant and appropriate for groundwater aquifers used or potentially used for drinking water.	MCLs for indicator compounds are the target cleanup levels for groundwater under each waste area; attaining the Soil Cleanup Goals will ensure that any future migration of residual contaminants in the soil will not exceed MCLs in groundwater under each waste area.
MASSACHUSETTS - Drinking Water Regulations (310 CMR 22.00)	Establishes maximum contaminant levels for drinking water supplies, as the federal MCLs.	State drinking water standards are the same as federal MCLs that will be attained.
MASSACHUSETTS - Groundwater Quality Standards (314 CMR 6.00)	Establishes minimum groundwater quality criteria.	State groundwater criteria will be attained by reducing residual soil contaminants to the Soil Cleanup Goals.

TABLE 5
ACTION SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE SELECTED REMEDY AT THE W R GRACE - ACTON SUPERFUND SITE, ACTON, MASSACHUSETTS

ARARs	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
MASSACHUSETTS- Standards for Owners and Operators of Permitted Hazardous Waste Facilities (310 CMR 30.510-516)^2	General facility requirements for waste analysis, security measures, inspections, and training requirements.	Facility would be constructed and operated in accordance with this requirement. All workers would be properly trained.
MASSACHUSETTS - Contingency Plan, Emergency procedures, Preparedness and Prevention (310 CMR 30.520-524)^2	Safety equipment and spill and leak control. Emergency procedures to be used following explosions, fires, etc.	Safety and communications equipment will be installed at the site, and local authorities will be familiarized with the operation. Plans would be developed and implemented during remedial design. Copies of the plans would be kept on-site.
MASSACHUSETTS - Manifesting, Recordkeeping, and Reporting (310 CMR 30.530-545)^2	Requires manifesting hazardous waste shipped off-site for disposal.	Waste materials shipped off-site for incineration will be manifested.

MASSACHUSETTS - Closure and Post-closure (310 CMR 30.580-595)[2]	Closure and post-closure of hazardous waste facilities. Comprehensive program for closure and post-closure of hazardous waste facilities are generally relevant and appropriate. The requirements for double liners are not appropriate for this site because the solidified material will be placed on top off an existing landfill. A leachate collection system is not appropriate because the ARS extraction wells will collect any contaminants migrating from the landfill.	The remedy will meet closure requirements because there would be a substantial removal of waste from the disposal areas; residual contamination would have low mobility and toxicity; pathways of potential exposure would be limited; and long-term monitoring would be provided. Hazardous materials excavated from the disposal areas will be stabilized and solidified, and contained by placing an impermeable cap over the landfill that meets the RCRA cap standards. A 30-year post-closure program will include monitoring and maintaining the cap, and monitoring groundwater.
MASSACHUSETTS - Landfills (310 CMR 30.620-633)	Establishes requirements for construction, operation, monitoring and maintenance of hazardous waste landfill.	The landfill cap will be constructed, operated and maintained in accordance with these requirements. The double liner and the leachate collection system are not appropriate for this Site.

MASSACHUSETTS - Groundwater Protection (310 CMR 30.660-675)[2]	Performance requirements for a groundwater monitoring network, and standards for a monitoring program and sample analysis.	Groundwater at each disposal area will be monitored to determine the effectiveness of the remedial measures; a groundwater monitoring program is already being implemented as part of the aquifer restoration system.
FEDERAL CAA - National Ambient Air Quality Standards (40 CFR § 50.6)[1]	Maximum primary and secondary 24-hour concentrations for particulate matter.	Standards for particulate matter will be met during excavation and stabilization activities, and construction of the landfill cap and Chip Pile cap.
FEDERAL OSHA - Worker Safety Regulations (29 CFR 1926)[1]	Specifies the type of safety equipment, training and procedures to be followed during construction of the remedy.	This regulation will be applicable during construction of the selected remedy.
FEDERAL Protection of Archaeological Resources (32 CFR § 229.4)[1]	Procedures for the protection of archaeological resources.	If archaeological resources are encountered during soil excavation, work would stop until the area has been reviewed by federal and state archaeologists. Research already completed suggests that none would be found at this site.

FEDERAL DOT - Rules for the Transportation of Hazardous Materials (49 CFR 107, 171.1 - 171.500)[1]	Specific requirements for markings, vehicle registration, manifests, and transportation of hazardous wastes and chemical substances.	Prior to transportation for off-site incineration, waste from the Blowdown Pit will be properly classified, packaged, manifested, marked, and labelled, and must have registration numbers including the letters DOT. Transportation of materials on-site for the VFL process will meet these requirements.
MASSACHUSETTS - Ambient Air Quality Standards, 310 CMR 6.00, and Air Quality Control Regulations, 310 CMR 7.00)[1]	Establishes primary and secondary standards for emissions of dust, odor and noise from construction and remedial activities.	Particulate and noise emissions during excavation and solidification activities will be meet the requirements. Odor emissions from the groundwater treatment air stripper will be controlled with Best Available Control Technology ("BACT"). A gas control system utilizing BACT will be installed during construction of the landfill cap to control emissions.

MASSACHUSETTS - Sanitary Landfill Regulations (310 CMR 19.00)[1]	Requirements for closure of solid waste landfills.	The Battery Separator Area chip piles will be closed as a solid waste landfill with, among other things, an intermediate cover consisting of impervious material or flexible membrane which prevents the percolation of surface or rain water.

---

1. Applicable.
2. Relevant and Appropriate.

levels of residual contamination in the disposal areas to these Goals, any leachate migrating from these disposal areas will not contaminate the groundwater at levels exceeding the ARARs.

2. Action specific

a. Federal Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act

The Commonwealth of Massachusetts has been authorized by EPA to administer and enforce RCRA programs in lieu of the federal authority. The authorized state hazardous waste regulations are equivalent to or more stringent than the federal RCRA regulations. Compliance with Massachusetts RCRA regulations is discussed below.

The applicability of HSWA regulations, specifically the Land Disposal Restrictions (LDR) promulgated under Section 3004 of RCRA, depends on whether the wastes are RCRA hazardous wastes, as defined under RCRA and in EPA regulations at 40 C.F.R Part 261. In this case, EPA has determined that the soils and sludges to be excavated and disposed of on the landfill are not RCRA hazardous wastes. The EPA has also determined that the sludges to be excavated are not sufficiently similar to warrant applying these regulations as relevant or appropriate.

b. Massachusetts DEP Hazardous Waste Regulations

Some Massachusetts' DEP Hazardous Waste Regulations are relevant and appropriate to the implementation of this remedy. Although this site does not have hazardous wastes, as discussed above, many of the state hazardous waste regulations for operating a hazardous waste facility and managing hazardous wastes are appropriate requirements for the kind of activities that will be taken at the Site and, therefore, are relevant and appropriate to the implementation of the remedy. Specifically, implementation of the remedy will comply with the following provisions of the Massachusetts hazardous waste regulations at 310 CMR 30.00: General management standards for all facilities (310 CMR 30.510-516); Contingency plan, emergency procedures, preparedness, and prevention (310 CMR 30.520-524); Manifest system (310 CMR 30.530-534); Closure and post-closure (310 CMR 30.580-595); Landfills (310 CMR 30.620-633); Groundwater protection (310 CMR 30.660-675); Use and management of containers (310 CMR 30.680-689).

The placement of contaminated soils and sediments under a cap will occur outside the 100-year floodplain, in accordance with location standards in the Massachusetts Hazardous Waste Regulations. Massachusetts closure and post-closure requirements requiring, among other things, that a cap attain a certain low permeability standard and act to minimize migration of liquids through the landfill in the long term, will be attained. In addition, the substantive elements of the contingency plan, emergency procedures, preparedness and safety requirements will be satisfied.

The portion of the landfill regulations requiring a double liner and a leachate collection and removal system are not appropriate to the site and will not be attained. Large volumes of wastes will be left in the landfill underlying the solidified material. Thus, placement of a double liner over the wastes in the landfill would be ineffective in containing the wastes. Any leachate that migrates from the landfill will be intercepted and collected by the Industrial Landfill Groundwater Recovery System.

c. Massachusetts Solid Waste Regulations

Closure of the Battery Separator Chip Pile will be conducted in accordance with the Massachusetts requirements for closure of a solid waste landfill. The chip pile, composed of waste trimmings discarded from the battery separator manufacturing operation, is considered a solid waste. The selected remedy for the chip pile will comply with 310 CMR 19.00, by installing an impermeable cover that will prevent the percolation of surface or rainwater, constructing the cap with proper slopes/finished grades, and groundwater monitoring.

d. Federal Clean Air Act and Massachusetts Air Quality and Air Quality Control regulations

The National Ambient Air Quality Standards promulgated under the Clean Air Act are applicable to the control of particulate matter and will be attained during excavation, treatment, and construction phases.

The Massachusetts Ambient Air Quality Standards are also applicable to the control of particulate emissions and noise during excavation and construction activities. The Air Quality Control regulations at 310 CMR 7.00, which authorizes the control of existing air strippers using Best Available Control Technology (BACT) for odor emissions, will be attained by installing a treatment system for air emissions from the ARS groundwater treatment facility. In addition, collection and treatment by BACT of gases generated by the landfill before release to the ambient atmosphere will comply with this ARAR.

e. Federal Occupational Safety and Health Act regulations and Massachusetts Right to Know law

OSHA standards for general industries and health and safety standards will be attained.

f. U.S. Department of Transportation Regulations

Any wastes excavated from the Blowdown Pit for off-site incineration will be transported in accordance with Department of Transportation regulations.

C. The Selected Remedial Action is Cost Effective

Of those remedial alternatives that are protective and attain ARARs, EPA's selected remedy is cost-effective in providing a protective remedy in a reasonable period of time. The cost effective remedy is a protective remedy whose costs are proportionate to its overall effectiveness.

Table 6 is a summary of the cost information for each alternative as provided in the Phase IV Report:
While the No Action Alternative is the least expensive alternative, it is not protective of human health or the environment and therefore is not a cost effective remedy

Complete On-Site Incineration and Complete Off-Site Incineration are the most expensive of the alternatives. While complete incineration would be effective in permanently reducing contaminant levels at the site, the costs of these alternatives are so great as to be disproportionate to their effectiveness. Furthermore, these alternatives will be difficult to implement and are not effective in the short term. These two alternatives will not be more protective than the selected remedy, will take much longer to complete, and are 15 and 67 times more expensive respectively than the selected remedy. For all of these reasons, EPA concludes that these alternatives are not cost effective because the additional costs do not provide a proportionately greater degree of effectiveness.

The Excavation and On-Site Encapsulation alternative and the Partial On Site Incineration alternative have reasonably similar costs when compared to the selected remedial action. However, similar to the three incineration alternatives just discussed, these two alternatives do not include soil cleanup levels, and plan only to remove sludges and two feet of underlying soils. Thus, they do not address residual contamination left behind after the remedial action is taken.

Furthermore, these two alternatives do not adequately address the Other Waste Sites. The Excavation and On-Site Encapsulation alternative does not use treatment as a principle element to reduce the mobility, toxicity or volume of the wastes. This alternative will not provide greater protectiveness than the selected remedy and therefore, is not cost effective. The partial on site incineration is much more difficult to implement,

Table 6 - Cost Summary of Each Alternative

ALTERNATIVE	TOTAL COST	CAPITAL COSTS	O & M COSTS
NO ACTION	$2,000,000	$0	$200,000
CAPPING IN PLACE	$5,048,000	$3,270,000	$1,778,000
SOLIDIFICATION AND CLOSURE OF LANDFILL	$7,058,000	$4,590,000	$2,468,000
ENCAPSULATION LANDFILL	$5,869,000	$4,117,000	$1,752,000
ON SITE INCINERATION	$12,614,000	$10,862,000	$1,752,000
OFF SITE INCINERATION	$71,558,000	$69,806,000	$1,752,000
COMPLETE ON SITE INCINERATION	$105,031,000	$103,303,000	$1,728,000
COMPLETE OFF SITE INCINERATION	$470,223,000	$470,495,000	$1,728,000

is not as effective in the short term, would not be as protective, and is almost twice the cost of the selected alternative. Therefore, partial on site incineration is not considered cost effective.

The Capping in Place alternative has reasonably similar costs when compared to the selected remedial action. However, considering the evaluation criteria, capping in place does not use treatment as a principle element to reduce the mobility, toxicity or volume of the wastes, it is not as effective in the long term as the selected alternative, and does not attain the response objectives for site cleanup. Therefore, capping in place is not considered cost effective.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The EPA has determined that the excavation, solidification and placement on the landfill and the capping components of the operable unit utilize permanent solutions and treatment technologies to the maximum extent practicable.

Remediation of the Primary Lagoon, Secondary Lagoon, Emergency Lagoon, Blowdown Pit, Battery Separator Lagoons, Boiler Lagoon and Tank Care Area to attain the Soil Cleanup Goals will provide a permanent solution.

Capping and properly closing and monitoring the Industrial Landfill is fully protective of human health and the environment. However, wastes materials in the landfill will be left in place. In this case, it is technically impractical from an engineering perspective to excavate and thermally destroy all the wastes contained in the Industrial Landfill, and therefore technically impracticable to permanently eliminate all waste materials at the Site. This is based primarily on the nature of the wastes present in the landfill. The evidence indicates that the landfill contains a wide variety of materials in a five acre area that is filled up to 19 feet deep. Excavation, waste handling and thermal destruction would take up to eight years to complete, and would present a significant potential for releases to groundwater, surface water and air during implementation.

Both incineration of the Blowdown Pit materials and solidification of sludges and soils from the disposal areas are alternative treatment technologies. Thus, the selected remedy satisfies the requirement to select a remedy that utilizes alternate treatment technologies.

E. The Selected Remedy Satisfies the Preference for Treatment as a Principal Element

The selected alternative uses solidification treatment as a principal element of the remedy to reduce risks associated with the site. This element addresses the primary threats at the site which are associated with the source areas. Approximately 39,000 cubic yards of source material will be treated by the VFL solidification process.

Stabilization and placement of wastes on the landfill will reduce the mobility of contaminants. The stabilization process converts the contaminated sludges and soils into a permanent, impermeable compacted mass exhibiting properties similar to that of soil cement. Leaching tests conducted as part of the pilot study showed that contaminant mobility from the stabilized material is significantly reduced.

Additionally, incineration of the most highly contaminated material from the Blowdown Pit will permanently reduce the mobility, toxicity and volume of this portion of wastes present at the site.

XII. STATE ROLE

The Commonwealth of Massachusetts Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also determined the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the W. R. Grace Acton Site. A copy of the declaration of concurrence is attached as Appendix D.

APPENDIX A - MODEL DESCRIPTION

The Record of Decision (ROD) contains a tabulation of Soil Cleanup Goals for five indicator compounds in seven waste areas at the site. As the ROD indicates, these levels are protective of public health and are intended to facilitate restoration of the groundwater at the site. It is expected that attaining these soil cleanup levels in disposal areas will allow groundwater beneath these areas to be restored to drinking water standards. These cleanup levels have been calculated using a model developed by Camp Dresser & McKee for W. R. Grace, and is based on published research and experimental data evaluated by EPA.

There are two aspects to this model: a conceptual or descriptive model of how contamination is released from the source areas and migrates into the aquifer beneath the site, and a mathematical approach for calculating and quantifying the distribution and transfer of contaminants through the soil and into the aquifer.

In the conceptual model, water from precipitation and snow melt percolates through the pores in the soil of the disposal areas. The source area soil consists of three phases or "compartments": soil particles, air in the pore spaces between the soil particles, and moisture (water) in the pore spaces. The moisture migrates through the soil and leaches out some of the residual contamination. The moisture content is continuously replenished by precipitation from above, so that the net volume percent of moisture in the bulk soil is constant. The water (i.e. leachate) migrates downward beneath the source area and enters the ground water. When it reaches the water table, the leachate mixes with the ground water beneath the source area and is diluted through the entire thickness of the aquifer above the bedrock. Because the groundwater beneath the site is flowing, the leachate entering the aquifer from the source above is continuously diluted by "fresh" groundwater arriving from upgradient. Leachate will be most diluted beneath sites where the aquifer is thickest and where ground water flow is most rapid.

Using the mathematical model, EPA calculated what the allowable bulk concentration of each contaminant in the soil could be, and still ensure that the concentration of indicator compounds in groundwater beneath the site be less than federal drinking water standards (maximum contaminant levels, MCL). The mathematical model consists of two parts. The first part of the calculation is commonly referred to as the Mackay method Level I, and it is a means of calculating the concentration and the quantity of each contaminant in each phase or compartment in the source area (i.e., soil particles, air in pores, and moisture). The second part of the mathematical model calculates how the leachate emerging from the source areas will be diluted when it reaches the ground water.

The Level I Mackay method (Mackay, 1979, 1981) is based on a fundamental principle of chemical thermodynamics which states that the fugacity of a chemical substance (e.g. vinyl chloride) must be equal in every phase (compartment) in the system at equilibrium. Fugacity is a thermodynamic property which may be thought of as the "escaping tendency" of a chemical substance from a phase. Fugacity, f, has units of pressure, and it may be directly related to concentration (C) through a factor Z:

$$C = f\ Z \qquad (1)$$

Z depends on temperature, pressure, the nature of the chemical substance, and the medium or phase in which it is present. At a given fugacity, if Z is low, C is low, and only a small amount of substance is necessary to exert the escaping tendency. Toxic substances thus tend to accumulate in phases where Z is high. Z permits one to calculate how a substance will partition among several phases in equilibrium.

For a gas (i.e. the pore air compartment), the fugacity is approximately equal to the partial pressure of the chemical substance, and Z can be shown to be equal to 1/RT, where R is the gas constant (8.2×10^{-5} atm-m^3/mol-deg) and T is temperature on the absolute (Kelvin) scale.

For a substance dissolved in a liquid (i.e. contaminants in the soil moisture or leachate), fugacity is related to concentration through the Henry's Law constant, H, and Z is equal to 1/H.

For substances adsorbed onto solids (i.e. contaminants adsorbed on the soil particles), the fugacity is related to the sorption partition coefficient, K_d, and the concentration of the substance in the water. K_d has been shown to be dependent on the fraction of organic matter in the soil, f_{oc}, and the organic carbon-water partition coefficient, K_{oc}. Thus, Z is equal to $f_{oc}\ K_{oc}\ D/H$, where D is the bulk density of the soil.

The mass of a substance in a compartment is related to concentration

$$M = C\ V$$

and therefore for each substance in each phase:

$$M = f\ Z\ V$$

For a cubic meter of bulk soil, the mass fraction of a substance may be expressed as follows:

$$\frac{M_a}{M_t} = \frac{V_a/RT}{[T]} \qquad \text{for air;} \qquad (2)$$

$$\frac{M_w}{M_t} = \frac{V_w/H}{[T]} \qquad \text{for water; and} \qquad (3)$$

$$\frac{M_s}{M_t} = \frac{V_s\ f_{oc}\ K_{oc}\ D/H}{[T]} \qquad \text{for soil particles;} \qquad (4)$$

where $T = V_a/RT + V_w/H + (V_s\ f_{oc}\ K_{oc}\ D)/H$

Va, Vw, and Vs are the volumes of air, water, and soil, respectively, and M_a, M_w, M_s, and M_t are the masses of air, water, soil, and total mass, respectively. Note that in the above equations, f has been cancelled out of the right side because it is identical in every phase or compartment.

Each contaminant is distributed among the three phases according to the partitioning ratios dictated by the Z value for each phase and compound. That is, each compound exists partially adsorbed onto the solid soil particles, partially as a vapor in the pores, and partially dissolved in the pore moisture. The expressions above allow one to calculate the mass fraction of a contaminant in each of the three compartments in the soil system. In order to solve equations (2), (3), and (4), it is necessary to select values for V_a, V_w, and V_s, expressed as fractions of a cubic meter. EPA determined that realistic values are 0.2, 0.1, and 0.7, respectively. The value for D, the soil bulk density, was based on actual measurements of soil sampled beneath the lagoon. The bulk density used in the model is 127 lb/ft^3 (approximately 2.0 gm/cm^3 = 2000 kg/m^3). The value for f_{oc} was chosen to be 0.001 (0.1%), which is considered to be reasonable for the types of soils encountered and is also the lowest value for which the relationship between K_d and K_{oc} is generally preserved.

The mass fraction of a contaminant in each phase or compartment (e.g. vinyl chloride vapor in the air-filled soil pores) may be converted to total mass or concentration of contaminant in each compartment in a cubic meter of soil if the total mass of the contaminant in the bulk soil is known. For example, the mass fractions for vinyl chloride, for the volume fractions given above, have been calculated to be:

$$\frac{M_a}{M_t} = 0.981$$

$$\frac{Mw}{M_t} = 0.017$$

$$\frac{M_s}{M_t} = 0.002$$

(Note that these values indicate that over 98% of the vinyl chloride in the bulk soil will partition into the air in the pore spaces.) If the total concentration of vinyl chloride in the bulk soil is 40 ppb, and if the bulk density of the soil is 2000 kg/m^3, the total mass of vinyl chloride in one cubic meter of the bulk soil (M_t) is 8.0 x 10^{-5} kg. Of this total mass, 0.017 x 8.0 x 10^{-5} kg = 1.36 x 10^{-6} kg of the vinyl chloride is dissolved in the soil moisture compartment. In one cubic meter of bulk soil, the volume of moisture is 0.1 cubic meters or 100 liters of water. The mass of water is 100 kg because the density of water is approximately 1 kg/liter. Therefore, the concentration of vinyl chloride in the moisture or leachate is 1.36 x 10^{-6} kg/100 kg = 1.36 x 10^{-8} kg/kg or 13.6 ppb.

The second part of the mathematical model is a simple mixing calculation. Leachate is assumed to be generated from the source area at the same rate that rainfall percolates into the soil, and this value is *chosen* to be 20 inches per year. This is approximately half of the regional annual rainfall, and 50% infiltration is a typical value. (The remainder of the precipitation is evaporated, taken up by vegetation, or runs off.) The amount of leachate generated per day (20 in./365 day) is multiplied by the area of the source (i.e. the lagoon) to obtain the daily volume of leachate that is generated from each source. The leachate entering the water table is then diluted by ground water entering the aquifer along the upgradient edge of the source area. This aquifer recharge rate is calculated by the rate of ground water flow beneath the site multiplied by the cross-sectional area of underflow (i.e. the thickness of the aquifer multiplied by the width of the site measured in the direction perpendicular to the direction of ground water flow.) A dilution factor, F, is then obtained:

$$F = \frac{\text{aquifer recharge rate + leachate generation rate}}{\text{leachate generation rate}}$$

The concentration of the contaminant in the ground water is calculated by dividing the leachate concentration by F.

EPA applied this mathematical model to calculate what the bulk concentration of the residual contamination of the soil could be and still ensure that the concentration of the aquifer beneath the site was below MCL. The approach used by EPA is the identical calculation described above performed "in reverse". If the concentration of a contaminant in the aquifer beneath the site is the MCL value, the concentration of leachate entering the ground water is obtained by multiplying MCL x F. This leachate concentration can be used to calculate the corresponding concentrations and masses in each of the other compartments, and also in the bulk soil. The concentration of the contaminant in the bulk soil, corresponding to the "drinkable diluted leachate", is the soil cleanup goal determined by EPA.

The attached memorandum dated August 7, 1989, documents the assumptions made in the model and provides the computer spreadsheets from the model.

References

Mackay, D., 1979. Finding fugacity feasible. Environmental Science & Technology, v.13 No. 10, pp. 1218-1223.

Mackay, D. and S. Paterson, 1981. Calculating fugacity. Environmental Science & Technology, v. 15, No. 9, pp. 1006-1014.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY BUILDING, BOSTON, MA 02203

MEMORANDUM

DATE: August 7, 1989

SUBJ: Proposed Plan - Modelling Assumptions
W. R. Grace Site - Acton, MA

FROM: Wayne M. Robinson
Remedial Project Manager

TO: W. R. Grace Site File

The attached information documents the assumptions used in the model developed by CDM, Inc. for establishing the Soil Cleanup Goals as indicated in the August 1989 Proposed Plan. Additionally, the attached information corrects some of the technical information submitted to EPA by W. R. Grace and CDM, Inc. The calculations follow the same modeling methodology as in the June 6, 1989 Addendum to the Phase IV Site Closure Plan, which can be found in Attachment A, Soil Cleanup Values. The following information is provided on the attachments to this memo:

> Page 1 through 2 provides the calculations for determining the volume ratios used in the model. This information include the bulk density of the soil, the volume of solids in the soil, the volume of water in the soil, and the volume of air in the soil.
>
> Page 3 provides the calculations for the rate of recharge through the waste area into the groundwater. Information presented is for the Boiler Lagoon, Tank Car Area and the Battery Separator Lagoons.
>
> Page 4 calculates the groundwater flow ratio under the lagoons. This factor is also called the dilution factor. It is calculated for all waste areas.
>
> Pages 5 through 7 are the spreadsheets from the model calculations. They follow the same methodology as the June 6, 1989 Addendum.

MODEL: WRG - RESIDUAL SOIL CLEAN-UP

Input Parameters

Bulk Density:

1982 GZA Report: Disposal Area Characterization

Bulk density of soils = 125 to 130 lb/ft^3, say 127 lb/ft^3
127 lb/ft^3 = 2.04 g/cm^3 say 2.0 g/cm^3

Volume Ratios:

V_s = volume of solids
V_w = volume of water
V_a = volume of air

The groundwater flow calculations are based on a porosity (n) = 30%.

if n = 0.3, then V_s must = 0.70

then calculate V_a and V_w: Void ratio = "e"

First calculate dry density = $\frac{\text{spec. grav. mat. (G)}}{1 + e}$ * unit wt of wat.

$$e = \frac{n}{1-n} = \frac{0.3}{0.7} = .38$$

$$\text{dry density} = \frac{2.65}{1 + .38} * 62.4\ lb/ft^3 = 119.8 \text{ say } 120\ lb/ft^3$$

In 1 ft^3 of material: bulk density - dry density = weight of water

127 lb - 120 lb = 7 lb. of water

There is 7 lbs. of water in 1 ft^3 of soil

If there is 7 lbs of water in 1 ft^3 then the volume of water is:

unit wt. of water = 62.4 lb/ft^3, if have 7 lb/ft^3

volume of water = 7 lb/62.4 lb/ft^3 = 0.11 ft^3

say: volume of water = 0.10 or 10%

if $V_s = 0.7$ and $V_w = 0.1$ then $V_a = 0.2$

Input to model: $V_s = 0.7$, $V_w = 0.1$, $V_a = 0.2$ $f_{oc} = 0.001$ (given by CDM)

RECHARGE THROUGH OTHER WASTE AREAS

Boiler Lagoon

$$20{,}000\ \text{ft}^2 * 20\ \frac{\text{in}}{\text{yr}} * \frac{1\ \text{ft}}{12\ \text{in}} * \frac{1\ \text{yr}}{365\ \text{days}} = 91\ \text{ft}^3/\text{day}$$

Tank Car Area

$$29{,}000\ \text{ft}^2 * 20\ \frac{\text{in}}{\text{yr}} * \frac{1\ \text{ft}}{12\ \text{in}} * \frac{1\ \text{yr}}{365\ \text{days}} = 132\ \text{ft}^3/\text{day}$$

Estimate of 29,000 ft^2 based on 8/7/89 conversation with Charlie Jutras, CDM

Battery Separator Lagoons

It is reasonable to assume the 3 Battery Separator Lagoon as one lagoon with a total area equal to the sum of 3. (discussed with Jutras 8/7/89)

$$78{,}450\ \text{ft}^2 * 20\ \frac{\text{in}}{\text{yr}} * \frac{1\ \text{ft}}{12\ \text{in}} * \frac{1\ \text{yr}}{365\ \text{days}} = 359\ \text{ft}^3/\text{day}$$

GROUNDWATER FLOW RATIO CALCULATION

The June 6, 1989 Addendum:

The average groundwater flow under each site was erroneously calculated for the Secondary Lagoon and Blowdown Pit. The correct values are:

Secondary Lagoon = 5346 ft^3/day
Blowdown Pit = 105.3 ft^3/day

also note: The 8/4/89 facsimile transmitted from C. Jutras to Wayne Robinson had errors which have been corrected on the attached copy.

$$\text{Groundwater ratio} = \frac{\text{flow under the waste area + recharge}}{\text{recharge}}$$

$$\text{Primary Lagoon} = \frac{252 + 109}{109} = 3.3$$

$$\text{Secondary Lagoon} = \frac{5346 + 456}{456} = 12.7$$

$$\text{Emergency Lagoon} = \frac{63 + 109}{109} = 1.6$$

$$\text{Blowdown Pit} = \frac{105.3 + 55}{55} = 2.9$$

$$\text{Battery Sep. Lagoons} = \frac{713 + 359}{359} = 3.0$$

$$\text{Boiler Lagoon} = \frac{203 + 91}{91} = 3.2$$

$$\text{Tank Car Area} = \frac{303 + 132}{132} = 3.3$$

8/7/89

Final

Addendum dated

Note: June 6, 1989 [illegible]
supplied H's for VDC and VC

```
3PHEPA.WK1
       Va        Vw       Vs  density      Foc
      0.2       0.1      0.7        2    0.001


   Tot Ma
 8.324315

   Tot Mw        Vw  Henry's     T Vw
      VDC       0.1    0.154 0.649350
       VC       0.1    0.695 0.143884
       EB       0.1  0.00644 15.52795
        B       0.1  0.00543 18.41620

   Tot Ms        Vs      Foc      Koc        Cs        H     T Ms
      VDC       0.7    0.001       65         2    0.154 0.590909
       VC       0.7    0.001      8.2         2    0.695 0.016517
       EB       0.7    0.001      680         2  0.00644 147.8260
        B       0.7    0.001       65         2  0.00543 16.75874
                                                 Fractions
    Tot M    Tot Ma   Tot Mw   Tot Ms     Tot M       Fa       Fw       Fs
      VDC  8.324315 0.649350 0.590909  9.564575 0.870327 0.067891 0.061781
       VC  8.324315 0.143884 0.016517  8.484718 0.981095 0.016958 0.001946
       EB  8.324315 15.52795 147.8260  171.6783 0.048487 0.090447 0.861064
        B  8.324315 18.41620 16.75874  43.49926 0.191366 0.423368 0.385265

 given 1 cu. m of soil and the assumed volume ratios
     bulk               percent  percent     water dry soil
  mass kg                 water    water   mass kg  mass kg
                         BY VOL    BY WT
     2000                   0.1     0.05       100     1900

                                 mass of   mass of  mass of  mass of    conc.
  kg or l               for MCL   contam    contam   contam   contam CLEAN UP
 of water                  ug/l water ug   soil ug   air ug total ug
      100       VDC           7      700       637     8974    10311      5.2
                 VC           2      200        23    11571    11794      5.9
                 EB         700    70000    666400    37526   773926    387.0
                  B           5      500       455      226     1181      0.6
```

1 x 10^{-6} risk

38.7

Bis-2
ethyl hexyl
phthalate 2ppb

H= 1.8 E-6

Bis 2.. K . 27542

These #'s in P.P
8/7/09.

```
   LAGOON
/fcanLEVELS~{esc}3pnEPA.wk1~                                   ALT L
                                                               ALT S
/fcanASSUME~{esc}3pneca.wk1~                                   ALT A
```

Vol Air	Vol Water	Vol Soil	Blk Den	Org Carb
0.2	0.1	0.7	2	0.001

```
/FS~R/FR{ESC}TABLE.WK1~                                        ALT S
```

PRIMARY	DILUTION FACTOR	ALT L LEACHATE	SOIL CLEANUP
VDC	3.3	5.2	17.0
VC	3.3	5.9	19.5
EB	3.3	387.0	1277.0
B	3.3	0.6	1.9
Bis 2	3 3	38.7	127.6
SECOND			
VDC	12.7	5.2	65.5
VC	12.7	5.9	74.9
EB	12.7	387.0	4914.4
B	12.7	0.6	7.5
	12.7	38.7	491.0
EMERG			
VDC	1.6	5.2	8.2
VC	1.6	5.9	9.4
EB	1.6	387.0	619.1
B	1.6	0.6	0.9
	6	38.7	61.2
BDP			
VDC	2.9	5.2	15.0
VC	2.9	5.9	17.1
EB	2.9	387.0	1122.2
B	2.9	0.6	1.7
	2.9	38.7	112.1

8/7/84
Final

```
     LAGOON
/fcanLEVELS~{esc}3pnEPA.wk1~                                     ALT L
                                                                 ALT S
/fcanASSUME~{esc}3pnepa.wk1~                                     ALT A

                    Vol Air   Vol water     Vol Soil     Blk Den     Org Carb
                        0.2         0.1          0.7           2        0.001


/FS~R/FR{ESC}TABLE.WK1~                                          ALT S


                                  ALT L
                   DILUTION     LEACHATE       SOIL
     BOILER          FACTOR                   CLEANUP
        VDC             3.2          5.2        16.5
         VC             3.2          5.9        18.9
         EB             3.2        387.0      1238.3
          B             3.2          0.6         1.9
  Bis-2                 3.2         38.7       123.8

     BAT SEP
        VDC               3          5.2        15.5
         VC               3          5.9        17.7
         EB               3        387.0      1160.9
          B               3          0.6         1.8
      Bis 2               3         38.7       116.1

    TANK CAR
        VDC             3.3          5.2        17.0
         VC             3.3          5.9        19.5
         EB             3.3        387.0      1277.0
          B             3.3          0.6         1.9
      Bis 2             3.3         38.7       127.7
```

CDM
environmental engineers, scientists,
planners, & management consultants

CAMP DRESSER & McKEE INC.

One Center Plaza
Boston, Massachusetts 02108
617 742-5151

WR Mark-up.
Flow calcs corrected
using porosity.

FACSIMILE TRANSMISSION FORM

TO: Wayne Robinson OFFICE: EPA-Canal St

FAX NUMBER: 573-9662

FROM: C. Julian

DATE: 8/4/89

JOB CHARGE: 798-71-SS GEAD GROUP NUMBER: 125

FAX OPERATOR: ________

# OF PAGES INCL. COVER 3

COMMENTS: Volumetric Flow rates under the Other Waste Sites based on Particle Tracks - ARS OFF

cc. J. Murphy
W. Cheeseman

MP OF ESSER & MCKEE CLIENT [illegible] JOB NO ______ COMPUTED BY [illegible]
PROJECT Other Waste Site Clean DATE CHECKED ______ DATE 07-13-8[illegible]
DETAIL ______ CHECKED BY ______ PAGE NO 1/2

Groundwater movement under Other Waste Sites

AQUIFER RESTORATION SYSTEM OFF

By Particle Tracking - Attached

Battery Separator Area

Velocity - 3 tracks
Left = 80 ft/year
Center = 90 ft/year
Right = 70 ft/year

7
Porosity

Saturated thickness - water Table to top of till
well BSL-1 till @ 61', water @ 37.5 ft ~~[illegible]~~ = thickness = 23.5'

BSL-1 Horiz projection width = 150'
Right Particle track - 70 ft/yr
Q = 70 ft/yr × 23.5 ft × 150' ÷ 365 days/yr = 676 ft³/day
*0.3 = 203 ft³/d

ave Q = (70+85+90)/3 = 82

BSL-2 Horiz Projection width = 300 ft
Avg left - center particle tracks ⇒ 85 ft/year
Q = 85 ft/year × 23.5 ft × 300 ft ÷ 365 days/yr = 1642 ft³/day
*0.3 = 493

82 ft/yr * 23.5 ft * 450 ft ~~*~~ ÷ 365 day/yr
*0.3 = 713

BSL-3 Horiz projection width = 150 ft
Center Particle track = 90 ft/year
90 ft/year × 23.5 ft × 150 ft ÷ 365 day/yr = 869 ft³/day
*0.3 = 261

USE ~~[illegible]~~ 82 * 23.5 * 450 ~~*~~ ÷ 365 * 0.3 = 713

Boiler Lagoon

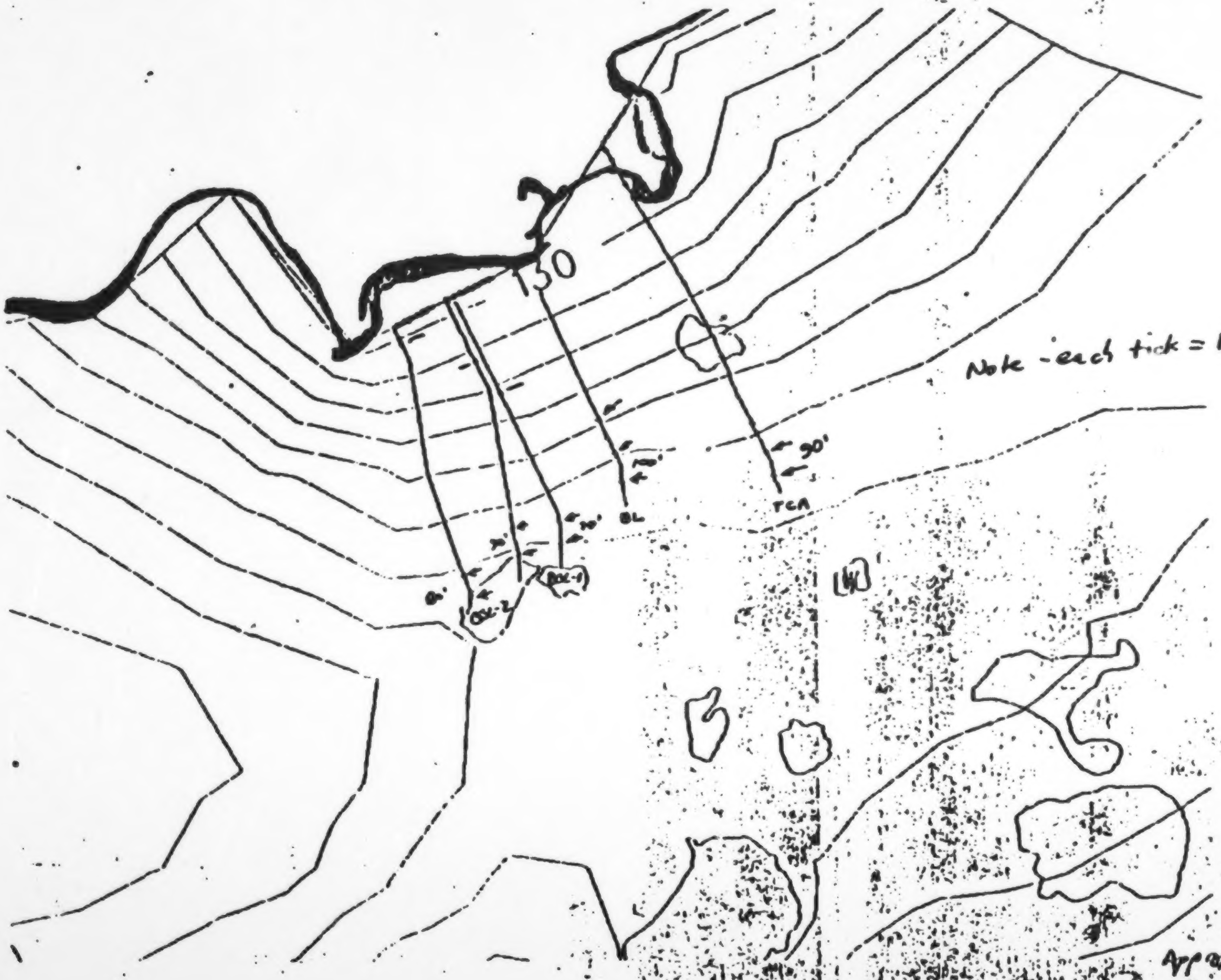
Velocity = 100 ft/year
Horizontal projection of width = 275 ft,
saturated Thickness - water table to top of till
BL-1 ~~[illegible]~~
till @ 51', water table at 37'
thickness = 14 Ft
Q = 100 ft/yr × 14 ft × 275 ft ÷ 365 days/yr - 1055 ft³/day
*0.3 = 316

Tank Car Area

Velocity = 90 ft/year
Horizontal projection of width = 100 ft

Saturated Thickness - water table to top of till
AR-18 till @ 87', water table @ 46'
thickness = 41 ft

Q = 90 ft/year × 41 ft × 100 ft ÷ 365 days/year = 1011 ft³/day
*0.3 = 202


30
90'
100'
BL
TCA
70'
30'
0'
BOC-1
BOC-2
LW

Note - each tick = 1 year

Appox Scale
1" = 500 ft

Heads FLOW62 - Level 6 - 2' con.

[illegible]

APPENDIX B - RESPONSIVENESS SUMMARY

FINAL RESPONSIVENESS SUMMARY
W.R. GRACE SUPERFUND SITE
ACTON, MASSACHUSETTS

SEPTEMBER 1989

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION I

W.R. GRACE SUPERFUND SITE
RESPONSIVENESS SUMMARY
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Preface

The U.S. Environmental Protection Agency (EPA) held a 30-day public comment period from August 15, 1989 to September 15, 1989 to provide an opportunity for interested parties to comment on the Phase IV Closure Plan (Phase IV Report) and the August 1989 Proposed Plan prepared for the W.R. Grace Superfund site (W.R. Grace site) in Acton, Massachusetts.

The Phase IV Closure Plan Report, prepared for the Site by the W.R. Grace Company with the oversight of EPA and the Massachusetts Department of Environmental Protection (DEP), examines and evaluates various options, called remedial alternatives, for addressing specific sources of contamination at the W.R. Grace site. EPA identified its preferred alternative for the cleanup of the Site in the Proposed Plan issued on August 10, 1989, before the start of the public comment period.

The purpose of this Responsiveness Summary is to summarize comments raised during the public comment period regarding the Phase IV Report, the Proposed Plan, and EPA's preferred alternative, and provide EPA responses. Citizen involvement and interest at the W.R. Grace site is high. There is an active citizens' group, Acton Citizens for Environmental Safety (ACES), which continues to monitor activities at the Site. The town of Acton has also been very involved as a participant in technical discussions and review of technical documents that have been prepared for the Site. At present, residents and local officials are primarily concerned with ensuring that EPA selects an effective and permanent cleanup remedy for the Site; establishing a short- and long-term monitoring program at the Site; and the possible effects that Site contamination could have on public health.

EPA has given careful consideration to all of these questions and comments before signing the Record of Decision selecting the final remedy to address sources of contamination at the W.R. Grace site.

This Responsiveness Summary is divided into the following sections:

I. Overview of Remedial Alternatives, Including the Preferred Alternative - This section briefly outlines the remedial alternatives evaluated in the Phase IV Report and the Proposed Plan, including EPA's preferred alternative.

II. Background on Community Involvement and Concerns - This section provides a brief history of community interest and concerns regarding the W.R. Grace site.

III. Summary of Comments Received During the Public Comment

Period and EPA Responses - This section summarizes and provides EPA responses to the oral and written comments received from the public during the comment period.

IV. Remaining Concerns - This section describes issues that may continue to be of concern to the community during the design and implementation of EPA's selected remedy for the W.R. Grace site. EPA will address these concerns during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

In addition, two attachments are included in this Responsiveness Summary. Attachment A provides a list of the community relations activities that EPA has conducted to date at the W.R. Grace site. Attachment B contains a copy of the transcript from the informal public hearing held on September 12, 1989.

I. OVERVIEW OF REMEDIAL ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

On August 10 1989, EPA released a proposed Plan for the Site, identifying a preferred alternative for addressing source areas of Site contamination. For a detailed description of the preferred alternative, and other remedial alternatives evaluated, refer to the August Proposed Plan document and the Phase IV Closure Plan. An outline of the major components of the preferred alternative, and a list of the other remedial alternatives evaluated for the Site in the Phase IV report, are provided below.

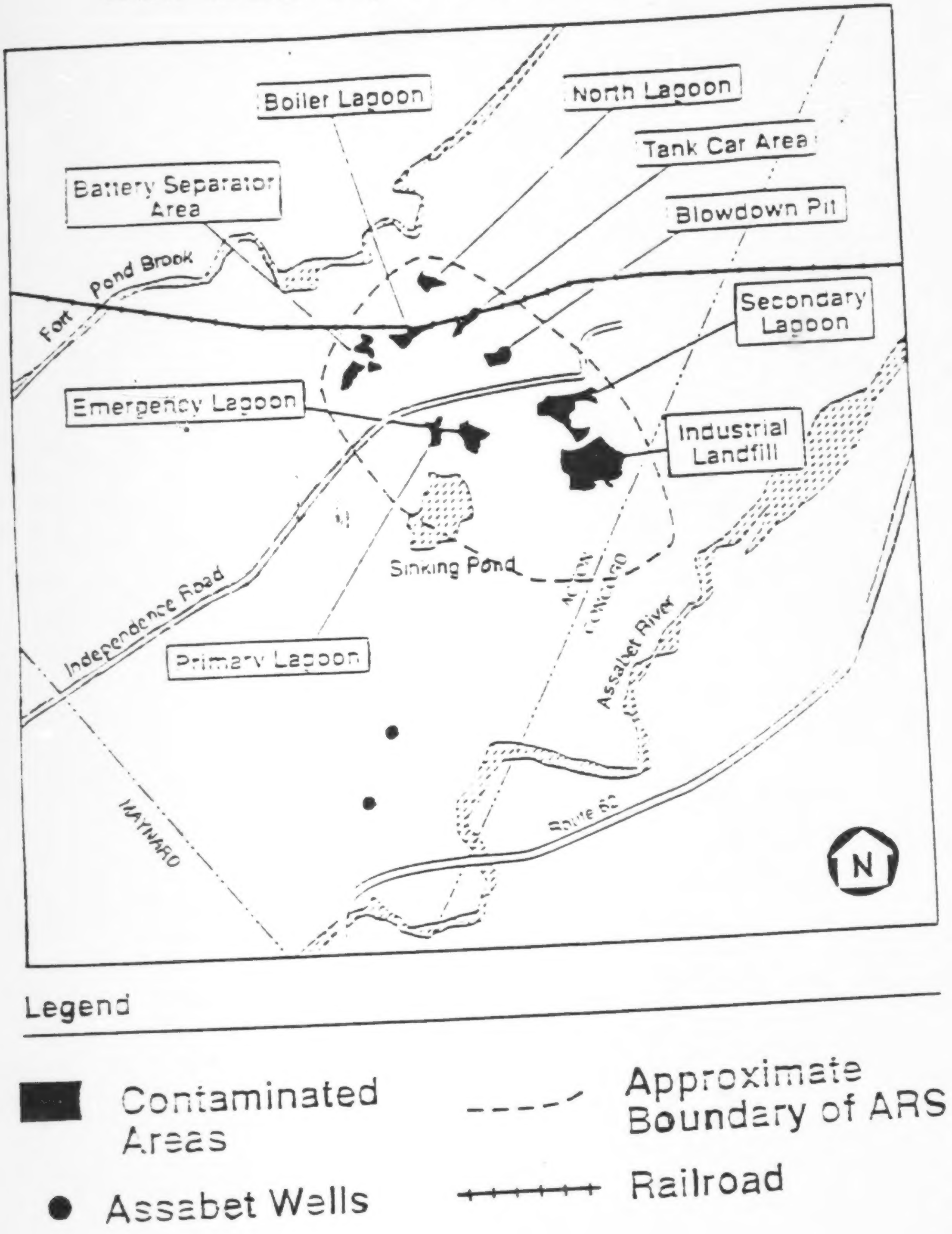
Components of the Preferred Alternative upon which public comment was taken include:

1. Excavation and transportation off-site for incineration of highly contaminated material from the Blowdown Pit (see Exhibit 1);
2. Excavation and stabilization of the remaining contents of the Blowdown Pit, as well as the contaminated sludges and soils of the Primary Lagoon, Secondary Lagoon, North Lagoon, and Emergency Lagoon;
3. Excavation of contaminated soils from the Battery Separator Lagoons, Boiler Lagoon, and Tank Car area;
4. Placing both the stabilized and the non-stabilized materials excavated from the Site on the existing Industrial Landfill, and covering these materials with an impermeable cap;
5. Closure of the Chip Pile Area;
6. Establishing Soil Cleanup Goals for all waste disposal areas;
7. Modifying the Aquifer Restoration System (ARS) to address air stripper emissions controls; and
8. Establishing compliance monitoring at each disposal area designed to monitor the effectiveness of the proposed remedy.

The additional six cleanup remedies considered for the are:

- No-Action Alternative

W.R. Grace Superfund Site Features Map


Boiler Lagoon
North Lagoon
Tank Car Area
Battery Separator Area
Blowdown Pit
Fort Pond Brook
Secondary Lagoon
Emergency Lagoon
Industrial Landfill
Sinking Pond
ACTON
CONCORD
Assabet River
Independence Road
Primary Lagoon
MAYNARD
Route 62
N
Legend
■ Contaminated Areas
● Assabet Wells
- - - - Approximate Boundary of ARS
+++++ Railroad

- Alternative 1: Capping in Place
- Alternative 2: Stabilization and Combined Closure on the Landfill
- Alternative 3: Excavation and On-Site Encapsulation
- Alternative 4: Excavation and a) On-Site Incineration; b) Off-Site Incineration
- Complete Incineration Alternative

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Interest from citizens local officials and the media has been high since contamination of municipal wells in Acton was first discovered in 1978, during Town review of W.R. Grace plans for expansion of its battery separator plant. The discovery of suspected carcinogenic agents in the water caused immediate concern and alarm in residents and local officials. In response to the findings, Acton closed the Acton Water Supply District's Assabet Wells #1 and #2. The wells supplied approximately 40 percent of the Town's water supply and community interest in the problem grew, even after well closure.

In December 1978, when the wells were closed, two community meetings were held with state and local officials and W.R. Grace Company representatives attending. These meetings were well attended and those present expressed great concern about possible health effects from past exposure to contaminants, and operations at W.R. Grace.

By 1979, the Town had developed new drinking water wells to replace the supply lost as a result of the Assabet well closures.. At that time, the Town and DEP began additional investigations of waste disposal practices at the W.R. Grace site to determine the cause of water supply contamination and the potential relationship between the Site activities and chemicals detected in the water supply wells. During that time, a group of about a dozen Acton residents formed a group called Acton Citizens for Environmental Safety (ACES). Since 1979, ACES has gathered information about problems at the W.R. Grace site, conducted research on technical and legal issues, reported to the media, testified at meetings and initiated the formation of a Health Effects Subcommittee of the Acton Board of Health. ACES has maintained regular communication with EPA and DEP, in addition to the Massachusetts Attorney General's Office and other branches of state government responsible for enforcing public safety and public health laws. Before 1980, ACES threatened to file suit against W.R. Grace Company in an effort to force the firm to address waste discharge and air emissions problems at the Site.

On October 21, 1980, EPA and the W.R. Grace Company signed a Consent Decree that set the terms under which W.R. Grace has proceeded with Site investigations and other Site activities. As work has proceeded at the Site the town of Acton has been apprised of Site study activities conducted under the oversight of EPA and DEP (formerly the Massachsuetts Department of Environmental Quality Engineering).

Since 1983, when the Site was added to the National Priorities List, EPA has conducted activities to keep the community and other interested parties apprised of Site activities through informational public meetings, press releases, and contact with interested community members and local officials.

In August 1984, EPA and DEP held a public meeting to discuss the Aquifer Restoration System proposed by W.R. Grace and plans for future study of the Site. Also in 1984, EPA initiated weekly technical meetings involving the participation of W.R. Grace, EPA, DEP, consultants employed by the Town of Acton, and local Acton officials. Based on public comment, EPA and DEP recommendations, the W.R. Grace Company installed and activated an Aquifer Restoration System (ARS) to begin the groundwater cleanup process.

Between 1984 and 1988, community interests in the Site were represented through Town of Acton participation in technical discussions. The high level of ACES involvement lessened during this period of Site study, however, citizens from Concord and Acton have voiced concern about odors from the Aquifer Restoration System since it went on line.

Upon completion of a Site investigation and evaluation of alternatives to address the sources of Site contamination, EPA and DEP released the results of the Site studies in the Draft Phase IV Closure Plan prepared by W.R. Grace. Upon release of the Draft Phase IV Closure Plan, the report was made available at the Acton Public Library. In December 1988, EPA and DEP held a public informational meeting in Acton at which W.R. Grace representatives presented the Closure Plan. The meeting was well attended by ACES members who have remained visible and active in expressing their concerns about the Site since that time.

In May, 1989, as a result of petition from citizens to the DEP asking for the Site to be designated as a Commonwealth of Massachusetts Public Involvement Plan site, EPA and DEP met with interested citizens to discuss community concerns, avenues through which Site information would be supplied to the community, and opportunities for public involvement in the process for achieving a Record of Decision at the Site. Following this meeting EPA and DEP maintained telephone contact and written correspondence to apprise the citizen's group of plans for public meetings and the projected schedule for public comment opportunities. EPA is currently working with DEP on a joint Community Relations Plan to establish mechanisms for public involvement during the remedial design and remedial action phases of Site activity. The plan will be presented to the community for comment in autumn, 1989, prior to finalization.

In July of 1989 EPA made the Administrative Record available for public review at EPA's offices on 90 Canal Street in Boston, and in Acton at the Acton Public Library. On August 9, 1989 EPA published a public notice and brief analysis of the Proposed Plan for source control at the Site in the Middlesex News. The public notice also announced the availability of documents for review as part of the Administrative Record, and provided information on the dates for a public informational meeting, informal hearing and comment period. This same information was released in a press release to the media and to the approximately 500 interested and affected parties on the Site mailing list. To facilitate public involvement further, the Proposed Plan for the Site was also mailed directly to all those on the Site mailing list.

In August 1989, ACES was awarded a Technical Assistance Grant (TAG) from EPA, to provide funds for a technical consultant to assist the group in its efforts to participate in review of future Site activities.

On August 14, 1989 the Proposed Plan for addressing sources of contamination and other new documents were made available for public review as part of Administrative Record. Also on August 14, 1989, a public informational meeting was held in Acton and attended by approximately 60 people, to review the Proposed Plan and provide opportunity for public discussion.

From August 15, 1989 - September 15, 1989, the Agency held a four-week public comment period to accept public comment on the alternatives presented in the draft Phase IV Closure Plan, the Closure Plan Addendum, Proposed Plan and on other documents that are part of the Site Administrative Record. A set of Site technical reports was also provided to ACES to enhance their ability to review and comment.

On September 12, the Agency held an informal public hearing attended by approximately 140 participants, including ACES members, area residents, local officials, representatives of environmental advocacy groups from Massachusetts and New Hampshire (where W.R. Grace has another facility), and representatives from W.R. Grace.

The comments received are summarized and responded to in the following sections of this document.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

This Responsiveness Summary addresses the comments received during the public comment period by EPA concerning the Phase IV Closure Plan (Phase IV Report) and Proposed Plan for the W.R. Grace site in Acton, Massachusetts. Eighteen sets of written comments were received from a Town of Acton official, area residents, Acton Citizens for Environmental Safety (ACES) representatives, a Sierra Club representative, and the W.R. Grace Company (WRG) during the public comment period (August 15 to September 15, 1989).

Thirty-six oral comments were presented at the September 12, 1989 informal public hearing. Individuals commenting at the hearing included a W.R. Grace Company representative, local citizens, one representative of the Acton Board of Selectmen, several representatives of ACES, one Sierra Club representative, several citizen and environmental advocacy group representatives, and a few individuals from New Hampshire active in community activities involving the W.R. Grace Company Nashua RCRA facility. A copy of the Informal Public Hearing transcript is included as **ATTACHMENT B.**

Public comments, both oral and written, along with EPA responses, are summarized and organized into the following categories:

- **A. Comments Regarding the Preferred Alternative**
  - **1. Excavation and Stabilization**
  - **2. Industrial Landfill and Capping**
  - **3. The Aquifer Restoration System (ARS)**
  - **4. Miscellaneous**
- **B. Comments Regarding Contamination at the Site**
  - **1. Ground and Surface Water Contamination**
  - **2. Soil Contamination and Sludges**
  - **3. Miscellaneous**
- **C. Comments Regarding Bioremediation;**
- **D. Comments Regarding Public Involvement; and**
- **E. General Comments.**

Certain responses refer to actions taken or approvals issued by Government Parties (GPs) under the Consent Decree. GPs include both DEP and EPA, rather than EPA alone.

A. Comments Regarding the Preferred Alternative

1. Excavation and Stabilization

Comment: One resident asked for clarification on whether EPA's proposed cleanup plans will completely remediate contamination at the Site.

EPA's Response:

The ROD indicates that the remediation of the W.R. Grace site will be achieved in three Operable Units (OUs) or three distinct steps: the first step is the control of sources of contaminants that are releasing contaminants to the environment by addressing the source areas on-site, the second step is to ensure the achievement of Soil Cleanup Goals in the source areas at the Site, and the third step is evaluation of groundwater contamination on- and off-site and determination of the need for more remediation than is currently provided by the on-site aquifer restoration system. The ROD addresses Operable Unit One, control of sources of contaminants. The plan does not describe in detail steps two and three because the GPs intend to address these issues subsequent to the source control remedies presented this ROD. Operable Units Two and Three will be subject to full community relations activities when the GPs develop proposed plans, in a process identical to that used on this ROD.

Comment: One citizen remarked that all pits and lagoons at the Site should be degassed before any other action is taken.
EPA's Response:
The transfer of volatile organic contaminants to the atmosphere is a concern of the GPs; the actual details of the excavation technique to be used at the Site will be determined during design. However, the GPs have stressed on numerous occasions to WRG the requirement to minimize releases of contaminants from source materials to any environmental media. The ROD focuses on this important issue requiring that all excavation activities will be performed using best engineering practices to minimize release of compounds to the ambient air or underlying soils.

Comment: An ACES representative remarked that they had been given no analytic data to help them to understand if the VFL process will actually stabilize the waste sludge and contaminated soils.
EPA's Response:
VFL treatability data is included in the Administrative Record and can be found in Appendix E VFL Pilot Program of the Phase IV Report. The Administrative Record is a source of extensive additional data and information on the Site available at the Acton Public Library and EPA.

Comment: Two ACES representatives stated that the only pozzolonic VFL prototype they are aware of at the W.R. Grace site exploded and failed, and requested more information on the explosion. One of the representatives stated that the VFL process is uncertain, unproven and difficult to use, that she has seen VFL pozzolonic material crumble easily, and asked for information regarding where the process has worked for 50 years.

EPA's Response:
The GPs are not aware of explosion hazards from the VFL process; the one incident that was of concern to the GPs was the addition of pozzolonic materials to sludges at a rate which caused the heat released from the exothermic reaction to boil water off the mixture. The rate of addition of material during the VFL process will be done in a controlled manner to control the amount of heat released to levels that would not elevate the mixture temperature significantly so this situation will not occur.

Comment: An ACES representative referred EPA to EPA research that indicates that organics can leach through the VFL material.

EPA's Response: The VFL pilot test and leaching studies indicated that the solidified material can be made to leach ethylbenzene at low levels under laboratory conditions. However, the GPs believe that containing the solidified materials beneath the impermeable cap will further minimize the potential for leaching. In addition, the selected remedy provides for groundwater monitoring at the landfill to detect any leachate. Furthermore, the remedy provides for the Industrial Landfill Groundwater Recovery System, which would collect and treat any leachate that is released from the landfill.

Comment: One citizen asked why only two feet of underlying soil will be excavated from the Primary, Secondary and Emergency lagoons.

EPA's Response:
The selection of two feet of soil beneath the lagoons was based on the analytical data that indicated the majority of contaminants are largely concentrated in the sludges and approximately the top foot of soil. Excavation of the top two feet of soil below all the sludges will remove the majority of contamination. The data are not complete enough to determine if excavation of two feet of soil will achieve the Soil Cleanup Goals. Post excavation analysis will be conducted following excavation. Additional investigations will be required for soils below 2 feet if the Soil Cleanup Goals are not met, as described in the ROD.

Comment: One citizen asked why EPA plans to excavate the Battery Separator, Boiler and Tank Car areas to a depth of five feet, rather than to the bottom of these areas plus an additional five feet.

EPA's Response:
The Battery Separator lagoons, the Boiler lagoon, and the Tank Car area have no discernable waste layers; therefore, excavation did not include reference to the bottom of the waste material.

Comment: Several commenters expressed concern that the material dug out of the lagoons will leave holes and emit gases and asked if EPA will survey the materials left behind, with a preference for multi-level soil sampling from the bottom of the lagoon excavation to the water table and what activities would be involved in such surveys. They indicated that an analysis of each excavated Site should begin immediately upon its excavation.

EPA's Response:

The ROD indicates that post excavation sampling and analysis program will be conducted within 30 days of excavation. The survey will include extensive and comprehensive horizontal and vertical soil sampling and analysis to determine if Soil Cleanup Goals have been attained. The post excavation sampling work plan will be required and approved by the GPs prior to the commencement of excavation of the lagoons.

Comment: One citizen requested that EPA require WRG to provide an explanation of the effects of the freeze-thaw cycle on solidified sludge.

EPA's Response:

The selected remedy has intentionally been designed to have at least four feet of fill material placed over the solidified waste to protect the stabilized mass from stresses associated with freeze-thaw cycles.

Comment: One Town of Acton representative stated that Goldberg, Zoino Associates (GZA), the Town of Acton's technical consultant, recommends that consideration be given to solidifying more of the contaminated soils and sediments from waste areas on-site, rather than simply placing them beneath the cap as additional fill.

EPA's Response:

The GPs do not believe the excavated material from the Other Waste Areas require solidification. However, should the analytical results show that a portion of excavated materials is contaminated at unexpected levels that indicate the unstabilized materials may present implementation problems or impact the effectiveness or protectiveness of the landfill remedy, then those materials would be stabilized prior to placement on the landfill or would be disposed off-site.

Comment: One resident asked what procedures would be used to measure Volatile Organic Constituents (VOC) levels during excavation and what would happen if previous estimates of 20 cubic yards to be excavated were 10 times too low. This resident also asked if this highly contaminated material will be excavated from the Blowdown Pit before or after the less contaminated material around it, and if it would be removed from the Site.

EPA's Response:
The remedy specifies that the wastes in the Blowdown Pit containing greater than 100 ppm of VDC will be excavated and shipped to an off-site hazardous waste incinerator for treatment. The volume of soils to be shipped off-site will be based on the volume of soils with concentrations of VDC greater than 100 ppm. If the volume is found to be so great that off-site disposal is not feasible, EPA would amend the ROD to reconsider this approach.

Comment: One resident asked how long it takes for VFL stabilized contaminants to decompose, and asked if the contaminants decompose gradually or precipitously after an indefinite period of time.

EPA's Response:
The first issue raised has not been resolved, since the VFL technology has not been in use for an infinite period of time. Studies performed under contract to WRG have looked at performance times of less than a year. However, the GPs expect that the lifetime of the material will be extended by the protection of the cap design.

Comment: An ACES representative asked why concrete containerization could not be used for immobilization of wastes.

EPA's Response:
The concept of creating a storage structure that would eliminate contaminant exposure pathways has been considered in Section 5.2.2, although concrete specifically has not been considered. However, a single barrier constructed of concrete would be limited in effectiveness largely due to its susceptibility to cracking with time. The EPA guidance for final cover design suggests the use of a design similar to that proposed for the landfill.

2. Industrial Landfill and Capping

Comment: There were numerous comments about the integrity; service life; construction of; and monitoring of the Industrial Landfill Cap. Many of these comments referred to cap rupture and leaking cap membranes caused by differential settlement of the Landfill. There were also many suggestions and recommendations for dealing with cap replacement and monitoring.

EPA's Response: Much of the existing information on the integrity of synthetic liner materials has been established by agencies such as the Bureau of Reclamation and the Nuclear Regulatory Commission, who use synthetic materials to contain liquid impoundments such as salt-brine ponds. These agencies report good results with 30 mil PVC liners with up to 30 years of service. The permeability of synthetic liners is approximately 10^{-12} cm/sec, whereas clay barriers exhibit permeability in the 10^{-5} to 10^{-7} cm/sec ranges. Therefore, it is safe to say that synthetic materials are quite impermeable. Manufacturers, in general, warrantee synthetic materials (HDPE 40 mils in thickness) for 20 years for chemical breakdown and ultra violet ray resistance.

Since the installation of the high density polyethylene (HDPE) material at the Grace facility is as a cap rather than a liner, it will not be subject to the extreme hydraulic heads that an impoundment liner would be subject to. With proper design and careful installation, it is not unreasonable to predict that the cap will provide an effective impermeable barrier for at least 30 years.

EPA will use the technical resource document "Covers for Uncontrolled Hazardous Waste Sites" (EPA/540/2-85/002) and "Final Covers on Hazardous Waste Landfills and Surface Impoundments" (EPA/530-SW-89-047) to judge the design of the Industrial Landfill cover system. Although we may not require that the final cover be designed in strict conformance with the guidance, we will require that any alternative cover system be designed to be at least as effective as the guidance cover system. Key to this design will be the following: top slopes which after settling and subsidence are between 3 and 5 percent; a surface drainage system capable of conducting run-off across the cap with no retention or ponding; a middle drainage layer designed to prevent clogging, overlain with a graded granular or synthetic fabric filter that allows discharge to flow freely and prevents liquid from backing up on the synthetic material cap; a detailed installation quality assurance program for placement and installation of the synthetic cap; a compacted soil layer overlying the solidified wastes and contaminated soils that will provide a firm foundation for the synthetic cap, as well as protecting the cap from direct contact with the solidified wastes and soils; and a detailed quality assurance program for placement of the solidified waste and soils on the existing landfill.

Settlement within the existing industrial waste landfill is expected to occur over the fill as the surcharge from the solidified waste material is applied. However, to minimize cover system damage from settlement and subsidence, EPA will require that the final cover be designed and constructed to allow for the total estimated settlement.

In making the estimate for settlement of the landfill, the following will be considered:

- consolidation of all waste layers in the existing landfill

- consolidation of soils and foundation materials underlying the landfill
- release of perched and pore water from the landfill as the surcharge is applied.
- consolidation of the solidified waste and contaminated soils after placement on the landfill; and
- consolidation of all final cover components.

Finally, EPA will require a written construction quality assurance program for inspecting the quality of construction materials and the construction practices employed in their placement. The quality assurance plan will address activities such as inspecting, monitoring, and sampling of the individual components of the cover system.

Comment: An ACES representative questioned the long term effectiveness, impermeability, and durability of the 60-mil HDPE membrane.
EPA's Response: The GPs believe the 60-mil HDPE material incorporated in a properly designed and maintained cap system is protective. The selection of HDPE and the evaluation of other cover designs is included in the Phase IV Report as part of the Administrative Record for this Site, which is available for public review.

Comment: One commenter asked about the occurrence of "hot spots" and the potential for chemical reactions to occur when chemicals from the on-site lagoons are added to the Industrial Landfill.
EPA's Response: The VFL solidification will reduce the mobility of the contaminants moved to the landfill from the lagoons. Since the surface materials on the existing Industrial Landfill are similar in chemical composition to those in the on-site lagoons the potential for chemical reactions that would cause problems is very slight. The cap design will effectively eliminate transport of contaminants from the solidified material and other wastes down through the landfill wastes.

Comment: A representative of the New England Chapter of the Sierra Club and another citizen urged EPA to reconsider its Preferred Alternative and to choose a remediation plan that not only involves excavation of wastes, but also renders them non-toxic. The Sierra Club representative stated that, because EPA has said that a cap is not necessarily a permanent solution and its effectiveness cannot be guaranteed, EPA's proposed plan appears to follow a short-term, cost-benefit approach to decision making. He also stated that if the costs of monitoring and maintaining the cap were factored in, the proposed plan may not be the lowest cost choice.

EPA's Response:
The EPA followed a procedure for remedy selection described in the Proposed Plan that is consistent with 40 CFR 300 the National Contingency Plan, CERCLA, and SARA. The alternatives retained for evaluation were evaluated using the nine generated from statutory requirements, the National Contingency Plan (NCP) and EPA policy. Costs were one of nine criteria presented on pages 10 and 11 of the Proposed Plan that EPA used to assess alternatives. The costs analyses presented in the proposed plan include monitoring and maintenance, and are present worth costs.

Comment: One citizen remarked that the enormous weight of the VFL-treated waste and the weight of the cap may cause materials to shift in the Industrial Landfill, causing the cap to rupture. The citizen asked how EPA plans to monitor the Industrial Landfill and asked whether EPA would take precautions to prevent a rupture from occurring.

EPA's Response:
The barrier layer actually resides above the solidified sludge and the bulk of the landfill cap materials. The vegetative layers, filter layer, and sand that lie above the barrier layer will not exert loads in excess of the barrier layer strength, and function to protect the barrier layer from disturbances from above. The GPs are confident that the cap will not fail solely due to the design of the cap. However, the remedy requires proper operation and maintenance meeting state ARARs that will ensure the long term integrity of the cap or identify needed repairs. In addition, the groundwater monitoring and subsidence monitoring programs will ensure that the cover system remains effective over time. If the monitoring data indicate a potential release of pore water from the landfill, the GPs will initiate an investigation and resolution of the cause of the failure.

Comment: One Town of Acton representative expressed concern about the integrity of the proposed Industrial Landfill cap in light of potential differential landfill settlement under the cap. He recommended using one, or a combination of, the following measures to address cap integrity:

1) deep dynamic densification of the landfill prior to sludge/cap placement to remove the non-consolidated mediated settlement;

2) use of a very heavy grade woven geotextile between the soil fill layer and the sand bedding layer immediately below the synthetic membrane; and

3) use of a synthetic membrane on top of a 2-foot clay layer.

He also asked EPA to require the placement of a geotextile material of sufficient thickness between the drainage layer and the subsoil layer such that it can be identified with the soil gas probes. He requested the implementation of a monitoring program for the cap shortly after its construction to identify breaches in the liner, and suggested that monitoring include the use of a closely spaced soil gas sampling grid after infusion of a tracer gas into the gas collection system, or the placement of 30-foot wide linear strips of geosynthetic net under the synthetic membrane that would each start at the apex of the landfill, run parallel to the slope, and terminate at the slotted collection pipe. He explained that this monitoring option would detect and identify the location of non-settlement induced cap failures and would provide redundancy for the cap itself.

EPA's Response:

EPA agrees that in dealing with large areas such as the Industrial Landfill, engineering analyses (i.e., one-dimensional consolidation etc.) would prove valuable in determining the potential for differential settlement of the cap. Consideration will be given to obtaining data of this type during the remedy design phase to support the final cap design.

Bullet 1: The ROD indicates that during the design of the landfill closure, an engineering analyses will be conducted to determine the potential for differential settlement of the landfill. If the results of the engineering analyses indicate the likelihood of differential settlement that may affect the long term integrity of the cap, deep dynamic densification or consolidation of the landfill will be evaluated as a pre-construction activity to mitigate the adverse impacts of unpredictable settlement on the integrity of the cap.

Bullet 2: As illustrated in Exhibit 4 of the Proposed Remedy, EPA intends to utilize a woven textile between the soil fill and the sand bedding layer beneath the synthetic membrane. The select grade for the geotextile will be based on load-bearing requirements determined during the remedy design.

Bullet 3: EPA will use the Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments, July 1989, to evaluate the design of the Industrial Landfill cover system. A key component of the design will be a compacted soil layer overlying the solidified waste that will provide a firm foundation for the synthetic cap.

Comment: One resident stated that EPA should require complete replacement of the cap after every three or four repairs.
EPA's Response:
Replacement of the entire five acre cap to address minor repairs would be impracticable, since anticipated cap problems would be localized. Since waste will be left in place, EPA and MA DEP will be reviewing the effectiveness of the cap on a periodic basis as required by CERCLA. If data indicate the need for full cap replacement at any time following remediation, the GPs will require such actions be taken.

Comment: One Town of Acton representative requested verification of the adequacy of the 6-inch thick drainage layer proposed as part of the cap, and specifically asked for information regarding the layer's capacity to transmit peak cumulative flows, particularly at the bottom of slopes.
EPA's Response:
The adequacy of the 6" drainage layer will be verified during the remedy design phase. The drainage layer of the cap will be designed to transmit peak cumulative flows and minimize any backup of liquids above the synthetic layer.

Comment: One citizen suggested EPA use the vent design proposed by WRG instead of the design proposed by the EPA in which internal vents from the landfill are not allowed to vent below the cap.
EPA's Response:
The primary concern of the GPs with regard to the vent design in the Phase IV Report is that uncontaminated soils beneath the cap added to protect the barrier layer above will be contaminated from below if waste vents are offset from surface vents as in the Phase IV Report.

Comment: One resident asked how much differential settlement is allowable before visual inspection of the cap is initiated.
EPA's Response:
It is anticipated that visual inspection of the cap will be triggered by several indicators; for example, actual field measurements indicating subsidence will be compared to an allowable settlement tolerance based on an estimated subsidence of the fill and cover system and the liner's engineering characteristics. The tolerances will be established during the design phase of the response action and will support an action value that will trigger liner inspection.

Comment: A representative of the New England chapter of the

Sierra Club requested that EPA investigate reports that acidic soil from another of W.R. Grace Company's facilities in Cambridge, Massachusetts was dumped at the Acton site. He pointed out that if acidic soils are present it is possible that metals are also leaching from the Site because metals are more susceptible to acids than are VOCs.

EPA's Response:

EPA plans to sample and analyze for metal and soil acidity during the excavation of the waste lagoons. Data generated from past sampling in the Phase III report (see indicator chemicals page 14 of the ROD) indicate that metals do not pose a significant risk at the Site.

Comment: One citizen asked for the elevation and dimensions of the capped area, and asked if this area would be an eyesore for abutting residences.

EPA's Response:

The final design elevations for the landfill cap have not yet been established, and will be established during the design phase of the response action. The preliminary design work has suggested an elevation apex of 208 ft. +MSL, approximately 10-15 feet above existing surrounding grades. Based on the surrounding mature vegetation, it is unlikely the cap will be visible from off-site.

3. The Aquifer Restoration System (ARS)

Comment: There were numerous comments concerning the ARS and the ARS computer model developed by Camp Dresser & McKee, Inc. for W.R. Grace. The commenters were concerned with the models validity in predicting contaminant transport conditions in the northeast sector of the Site in the general direction of Lawsbrook Road and the effectiveness of the ARS in capturing contaminants before they leave the Site.

EPA's Response: The remedy under consideration will effectively remove contaminant sources from contributing further contamination to the groundwater under the Site. The approach described in the ROD acknowledges the need for further investigation of the migration of contaminants in groundwater (OU Three) and the placement of the proposed Industrial Landfill groundwater recovery system and assure collection of any contamination migrating from the Landfill in the northeasterly and easterly direction. The ARS computer model was developed by CDM for WRG to simulate the direction and flows of groundwater passing through the Site and also to predict the physical behavior of the contaminants that are released from the waste areas to the groundwater under the Site. Review of the quarterly monitoring data from the ARS by EPA and the MA DEP since its commencement of operations in March 1985 indicate that it is effective in capturing the majority of contaminants and removing the VOCs from the contaminated groundwater plume. However there is uncertainty with respect to the actual area of containment and this will be investigated during OU Three. The Consent Decree stipulates the continued operation of the ARS until the aquifer is restored to a fully useable condition.

Comment: The W.R. Grace Company stated that it believes that the ARS will achieve the cleanup standard of restoring the aquifer to "a fully usable condition." It also stated that the Proposed Plan for cleanup of specific source areas of contamination will ensure compliance with the Consent Decree.

EPA's Response:
The remediation of groundwater is enhanced by the actions in the selected remedy; however, WRG is responsible for compliance with the Consent Decree, and the EPA intends to focus on existing uncertainties in the performance of the ARS in evaluations conducted under OU Three.

The selected remedy is a source control remedy. The operable unit approach described in the ROD identifies the need for additional steps to fully remediate the WRG site. Therefore, the selected remedy is a partial remedy to the WRG site problems, and items raised in these comments will be addressed in the ongoing evaluation of migrated contaminants as discussed in the ROD for soil contamination and for groundwater contamination management. Each subsequent step will include opportunities for public comment identical to those provided for with this ROD.

Comment: One resident referred to the ARS and the trap for keeping the orange slime in a drainage ditch above the Sinking Pond. He asked if the trap is operating, if it has ever been cleaned, and if there is a schedule for periodic cleaning. He cautioned that an inefficient or inoperable trap would allow materials into the pond that would probably never leave.

EPA's Response:
The orange slime referred to in the above comment is the ferric hydroxide floc formed from the naturally occurring iron in groundwater treated in the ARS. As ferrous iron is exposed to oxygen, ferric iron is formed; ferric iron is insoluble and forms the rusty colored deposits. Control of these deposits is largely an aesthetic concern, and will continue to be handled by the MA DEP enforcement of provisions of the discharge permit issued to WRG for the ARS.

Comment: One resident asked what the plans are for stabilizing the exposed shores of Sinking Pond to prevent erosion of sediment once the ARS system is shut off and the Pond subsides.

EPA's Response:

The Consent Decree and Administrative Order prescribe a phased program of groundwater remediation that led to the design and implementation of the ARS. Concerns such as those expressed in this comment will be addressed under the continuing aquifer restoration and under OU Three.

Comment: Commenters requested that EPA require WRG to utilize the best available control technology to eliminate offensive odors from the Stripping Tower and inquired what the air quality levels are expected to be.

EPA's Response:

Emissions from the stripper at the time of remedy implementation is a concern that the GPs have taken into consideration during formulation of the selected remedy. The ROD indicates that in accordance with Massachusetts Air Quality Control Regulations in 310 CMR 7.00, the ARS air stripping tower will be upgraded by installing best available control technology (BACT). It is anticipated that BACT would be carbon adsorption to control contaminant levels in air emissions from the groundwater treatment facility. This requirement is being imposed on new air strippers and any existing units that are modified or found to cause an odor. If additional controls or changes in operations are needed to address odors, they will be required. The requirement for Best Available Control Technology (BACT) at the air stripper will reduce to the extent practicable the gas phase contaminants at the point of emission. The specific technology and the levels of reduction that will be achieved, and a performance demonstration requirement in terms of removal efficiencies and target stack and ambient concentrations will be established in the design phase of the remedy.

Comment: One resident urged that the ARS system remain in operation at least until groundwater monitoring reveals concentrations at or less than the most updated MCL levels at the time of monitoring. The commenter asked EPA to consider using an alternative groundwater target cleanup level.

EPA's Response:

EPA will require the continued operation of the ARS until the aquifer is restored to a fully useable condition; decisions regarding standards to be used to determine the fully useable condition have yet to be established. Promulgated standards and site-specific risk based levels will be fully considered in the decision-making process.

4. Suggested Alternatives

Comment: Many commenters suggested remedial alternatives to the proposed cleanup of solidifying Site contaminants and capping the landfill. These alternate suggestions included: excavating and lining the landfill or creating a new landfill; air stripping the contaminated sludge and soils instead of moving them to the Industrial Landfill; transporting the waste to an off-site facility; or use other remedial technologies such as in-situ bioremediation or on-site incineration or some other in-situ technology. Some commenters expressed dismay that EPA had not developed its own engineering plan, but instead relied almost entirely on the alternative proposed by CDM, WRG consultant.

EPA Response: The Phase IV Report, like all feasibility studies, evaluated a number of distinct alternatives representing a range of remedies. Although some of the commenters suggested alternatives or technologies that were not specifically evaluated in the Phase IV Report, the Phase IV Report evaluated a range of alternate approaches like those suggested in the comment.

The process of developing the Phase IV Report followed the phased approach outlined in the 1980 Consent Decree and Administrative Order, and closely paralleled the EPA established procedures for developing a Feasibility Study under the NCP.

EPA followed a procedure for remedy selection described in the ROD that is consistent with 40 CFR 300 the National Contingency Plan, CERCLA, and SARA. The first phase of remedy selection included completion of remedial investigations and the identification and screening of alternatives. The screening process was completed and conditionally approved by the GPs prior to issuance of the first Draft Phase IV Report.

The Phase IV Report reflects a two and one half year interactive effort between WRG, EPA, Massachusetts DEP, and consultants to WRG and the Town of Acton. The first Draft Phase IV Report was issued in December 1986; additional Phase IV Report revisions/addendums were issued in response to EPA comments in February 1987, March 1988, May 1988, August 1988, and June 1989. During the course of these various revisions, numerous meetings and consultations were held between the GPs and WRG representatives, during which the GPs directed WRG to correct, modify, revise, and expand analyses as necessary to reach an acceptable feasibility study useful in providing a foundation for the selection of a remedial action by the GPs. The Phase IV Report was extensively reviewed at each revision by GPs engineers and scientists, and their consultants. The efforts of the past few years have considered a range of feasible alternatives for cleanup of the source areas at the Site. EPA and MA DEP have independently reviewed and analyzed the alternatives that are appropriate for the Site and believe the Phase IV Report is of sufficient technical quality to proceed with the selection of a source control remedy.

5. Miscellaneous

Comment: A number of commenters expressed concern about assuring the long-term operation and maintenance of the landfill component of the remedy. The effectiveness of the landfill remedy design depends on regular maintenance and repairs to be conducted by WRG, including the possible replacement of the cap in the future. The commenters fear that WRG financially will be unable to bear the future costs of such maintenance, and suggest that the remedy include a requirement for WRG to establish a financial mechanism, such as a trust fund or an escrow account, with sufficient funding to assure that the cap and landfill component of the remedy will continue to operate as designed.

EPA's Response:

The selected remedy does not include a financial assurance requirement, such as a trust fund, for several reasons. When a Site has been added to the National Priorities List, pursuant to Section 105 of CERCLA, response measures authorized by EPA may be funded from the Hazardous Substance Superfund. If WRG refuses or is unable to conduct the work, then EPA may use the Fund to perform the work itself and seek to recover those costs from the responsible party. In addition, EPA may use the authority of Section 106 of CERCLA to order WRG to conduct the work. In this case, WRG's implementation of the remedy is governed by the Consent Decree under which WRG has already agreed to conduct a cleanup specified by EPA. If WRG fails to properly implement and maintain the remedy, or the remedy fails, EPA will have the options of performing the work itself, enforcing the Consent Decree, or initiating a new enforcement action, as described above. Also, Section XVI of the Consent Decree protects the community from the possibility that WRG will sell the property to a party who will not maintain the remedy by specifying that Grace shall not convey any title, easement, or other interest in the property "without complete provision for the fulfillment of all requirements of this decree." Grace is required to obtain the consent of the United States before it can transfer any property at the Site. A final reason why no financial assurance requirements are imposed in this ROD is that, generally, EPA does not impose financial requirements in a Record of Decision to assure a remedy will be implemented at Superfund site. Such administrative requirements are not considered to be ARARs under Section 121 of CERCLA.

Comment: WRG stated that, as set forth in the Phase IV Report, it believes that the Proposed Plan will achieve the statutory standards listed on page 10 of the Proposed Plan.
EPA's Response:
EPA has determined that the Proposed Plan, as developed by EPA, will achieve the statutory standards listed on page 10 of the Proposed Plan.

Comment: One citizen asked how the public can be sure that only five indicator compounds need to be treated and that no other toxic materials are accumulating somewhere else in the Site environment. The citizen asked why other chemicals present at the Site will not be monitored, and asked EPA to provide the rationale for selecting only five chemicals as indicator compounds.
EPA's Response:
The establishment of clean-up goals for a select group of indicator compounds is consistent with the EPA approach for Superfund site remediation. The purpose of this approach is to focus the remedial effort on those contaminants of greatest concern, while assuming that any treatment system designed to eliminate these compounds will also reduce the levels of other Site contaminants. The ROD indicates that to the extent other compounds are identified at any time in the underlying soils that would not be adequately addressed by the selected indicator compounds, additional remediation would be required to attain the cleanup objectives. Confirmation sampling will include analysis for other compounds, including heavy metals known present at the Site. Confirmation sampling will seek to confirm the remediation plan to use indicator compound soils cleanup goals to assure all contaminant levels are reduced to acceptable levels protective of human health and the environment. The selected remedy includes a commitment to perform additional remediation to attain cleanup objectives if compounds other than the indicator compounds are identified in the soils; in order to achieve this, confirmation sampling will include all contaminants known present at the Site.

Comment: One citizen asked if EPA establishes cleanup objectives for a site based on reducing rather than eliminating risks to public health, and if so, what level of risk EPA is attempting to achieve. The citizen referred EPA to page 9, paragraph 1 of the Proposed Plan.
EPA's Response:
Section 121 of the Superfund statute requires that the remedy at a minimum, must assure protection of human health

and the environment. EPA uses risk management tools to determine protectiveness. Using these tools, EPA has selected protective Soil Cleanup Goals in conformance with the requirements of the statute. The risk is within an acceptable range of 10^{-4} to 10^{-7}.

Comment: An ACES representative referred to page 9 of EPA's Proposed Plan, where it is stated that the soil cleanup goals were generated using a model developed by the WRG and asked if EPA could provide detail on that model.
EPA's Response:
Appendix A of the ROD has a full description of the model used to determine Soil Cleanup Goals.

Comment: Commenters asked when excavation activities would begin and how remedial cleanup actions can begin early in 1990 when EPA has not yet entered the Design Phase.
EPA's Response:
The implementation of remedial activities will depend on the finalization of and approval by the GPs, all prerequisite design and planning activities. Implementation will occur as soon as possible in order to mitigate any continuing releases addressed in this source control remedy.

Comment: A New Hampshire resident asked if all waste materials from the Site would be incinerated in Acton or if they would be transported to Nashua for incineration in the facility there.
EPA's Response: Blowdown Pit materials contaminated with 100 ppm or greater levels of VDC will be transported off-site for incineration at a RCRA incineration facility licensed to incinerate the type of waste from the WRG Site in compliance with all applicable state and federal requirements and in compliance with the EPA's off-site policy. The actual facility has not yet been identified. However, the incinerator at the WRG Nashua facility is a process waste incinerator and is not licensed to accept hazardous waste for treatment.

Comment: Commenters asked how much consideration cost factors were given in EPA's evaluation of cleanup alternatives.
EPA's Response:
In selecting the remedy for the Site, EPA evaluated each alternative against nine established evaluation criteria, as required by the statute. The purpose of this analysis is to objectively assess the alternatives against each criteria to determine the relative performance of the alternatives and identify major trade-offs between them. One of the criteria is costs. EPA used all of the information, including costs,

to select the remedy for the Site.

Comment: One resident asked whether or not an artificial removal/recharge scenario has been simulated with CDM's computer model to determine if it will adversely affect quantity/quality of groundwater available to Assabet Wells.
EPA's Response:
Such a study has not been performed since the studies performed in association with the ARS program in the early 1980s. Since the ARS has been in operation for a number of years without a significant adverse hydrologic impact on the Assabet Wells, and the hydrology of the aquifers do not suggest that the selected remedy will impact Assabet Wells, none is planned at this time. However, under OU Three, these scenarios may be considered.

Comment: One citizen referred to the Environmental Reporter, Volume 18, number 40, page 2079, January 29, 1988 which discusses two landfills which have sludge contaminants comparable to the ones at the W.R. Grace site in Acton. The citizen referred EPA to case number EPA V38816DC, and asked that EPA read that article and the remedies described there and explain how it applies to the Acton site.
EPA's Response:
The report referenced above cites an enforcement action taken in EPA Region III at the Coker's Landfill. The article contained no descriptions of remedies; it referred to a January 5, 1988 Administrative Consent Order that outline a program of study leading to the development of remedial alternatives, similar to the program used to date at the WRG site.

Comment: One resident asked where the Chip Pile Area is located and asked if the Chip Pile Area will be remediated.
EPA's Response:
The Battery Separator Chip Pile is located within the Battery Separator Area. The Battery Separator Chip Pile will be closed as a solid waste landfill in accordance with Massachusetts Regulations in 310 CMR 19.00. These regulations require, among other things, capping the disposal area with an impervious material. The 310 CMR 19.00 regulations prescribe a thorough closure program that the GPs believe is protective. The final cap over the Chip Pile will consist of a minimum of twelve inches of impervious final cover material with a coefficient of permeability of less than or equal to 1×10^{-7} centimeters per second, or a synthetic equivalent, overlain by at least a six inch minimum thickness of drainage blanket layer of sand, and a top layer of at least six inches of loam that will support vegetation. The final cap will be graded so that surface water will not accumulate and will be at a

slope greater than three percent.

Comment: One Town of Acton representative recommended evaluating the feasibility of including excavated Chip Pile materials under the cap proposed for the Battery Separator Lagoons to consolidate the waste piles and to decrease the size of the pile that would require capping. The commenter suggested that this option could result in lower capping costs and enhanced cap integrity and stability.
EPA's Response:
EPA will consider during the design phase, the technical feasibility of excavating the Chip Pile and placing these materials into the Battery Separator Lagoon prior to capping.

Comment: A representative of the New England chapter of the Sierra Club stated that the presence of metals in incinerator ash is not a valid reason for EPA to have rejected the choice of on-site incineration because metals are already present in the material EPA proposes to leave on-site. He also stated that the composition of ash could be determined by trial burns prior to full-scale incineration.
EPA's Response:
On-site incineration was not rejected solely based on the metals in ash concerns. The implementability and short-term effectiveness of excavating the landfill was considered. The excavation of the landfill and materials storage and handling would present the threat of contaminant release in air emissions over several years. The potential for releases is increased for off-site incineration, due to shipment preparation. Also, due to the heterogeneous nature of wastes present in the landfill, more than one incineration technology may be required.

Comment: One resident requested that the ROD explicitly state that EPA and DEP retain the right to require further action at the Site in the future.
EPA's Response:
The ROD requires further action at the Site under OU Three. The decision contained in this ROD, OU One, provides for surface remediation. Future EPA decisions will address the need for residual soil contamination and groundwater contamination.

B. Comments Regarding Contamination at the Site

1. Ground and Surface Water Contamination

Comment: One ACES representative requested maps of contaminant plumes showing where the plumes are going, and what they will do in the Assabet River. The representative also asked that plume maps be prepared not only by year, but by contaminant, as well.

EPA's Response:

These comments address migrated contaminants associated with groundwater contamination. This ROD addresses only the source control Operable Unit and acknowledges the need for further investigation of the groundwater. Items raised in these comments will be addressed in the future during Operable Unit Three.

Comment: An ACES representative reported that, based on two documents prepared for the Acton Water District and noted below, there is evidence that "the Secondary Lagoon (on W.R. Grace property) and vicinity is the primary potential source area for the VDC plume" detected in the Lawsbrook Aquifer. The representative cited two relevant documents:

- "Lawsbrook Aquifer Contamination Study", File No. A-2949, by Goldberg-Zoino & Associates (GZA), March 1985.
- "Reconnaissance Contaminant Hydrology, Southern Lawsbrook Aquifer", by Pine and Swallow Associates (PSA), May 1986.

The representative stated three conclusions that it reached following a review of these two documents. These are listed below:

1. It is apparent that the original contaminants from the W.R. Grace site have taken, and will continue to take, a long time to finally migrate off-site to other locations.
2. The above studies reveal that theoretical models are of value in pointing to and estimating potential contamination problems and their sources. However, the modelling must be based on sound input from extensive and reliable data sources, and must be redone every 4 or 5 years.
3. All modelling must be verified by field measurements from observation wells at varied locations and at varied depths and times.

EPA's Response:

This comment address contamination associated with the groundwater migration and suggests that modelling be recalculated and verified by field measurements. This ROD is a source control OU and requires future groundwater investigations. These comments will be considered during the future groundwater study and decision.

Comment: An ACES representative, referring to the contamination issues discussed in the previous comment, asked what consideration has been given to other possibly polluted areas, such as the private wells serving the Parker Street apartments and condominiums. The representative expressed concern that, while this water is not used for drinking, it is used regularly in lawn care sprinkler systems, and if contaminated, could contribute to air pollution. The representative asked if homes using private wells would receive warning that there could be contaminants in their water.

EPA's Response:
This comment is not specific to the selected remedy. However, Massachusetts and the local Board of Health should be consulted for advice concerning the use of individual water supplies.

Comment: One resident asked what the present source of drinking water is for citizens living in areas where wells have been contaminated. In addition, the resident asked how often the present water supplies are tested for contamination, whether the results of such testing are made available to the public, and what level of contamination is allowed in drinking water.

EPA's Response:
This comment is not specific to the selected remedy. However, Massachusetts and the local Board of Health should be consulted for advice concerning the use of individual water supplies.

Comment: The W.R. Grace Company expressed concern regarding the soil cleanup levels EPA has set for bis (2-ethyl hexyl) phthalate at the Site, because analyzing for phthalates (BEHP) in soil is more prone to inaccuracies than analyzing for them in water, and because there is also a high probability of BEHP laboratory contamination. For this reason, they proposed relying primarily on groundwater analyses to ensure that BEHP contaminants will not exceed MCLs in groundwater.

EPA's Response:
These comments address contaminants associated with soil, as compared to groundwater contamination. The selected remedy addresses soils contaminants in the source control operable unit remedy in order to safeguard against exposures including continuing releases to groundwater, and acknowledges the need for migrated contaminant management. Groundwater issues raised in these comments will be addressed in Operable Unit Three. While groundwater monitoring is required under the ROD, requirements for soils cleanup is an important component of the remedy, despite the fact that analysis of soils is subject to greater variability than analysis of groundwater.

The detection limit range of 20 ppb to 2000 ppm listed in the comment reflects the fact that the soils matrix influences the achievable detection limit, not the BEHP analyte. This is common to all soils analyses, not only BEHP. The sample preparation steps taken to release soils contaminants for analysis is an additional step not needed in water analysis that reduces the accuracy of soils analysis. In addition, the range also depends on the number of other analytes present and the need to dilute samples to complete an analysis for multiple analytes in survey mode, which is a costs factor rather than a purely technical issue. The CLP limits of detection for BEHP in soils is 330 ppb; the 1600 ppb value given in these comments refers to phenols. The CLP methods may not be appropriate for WRG in determining if soils cleanup goals have been met. EPA method SW 846 Method 8060 (Modified) includes GC/MS analysis with precautions for cleanup of glassware and reagents that can achieve lower detection limits than other methods.

Comment: Several commenters requested more stringent groundwater cleanup goals than drinking water MCLs and indicated that such goals should be below drinking water MCLs.

EPA's Response:

EPA's Superfund program operates within the framework of EPA's Groundwater Protection Strategy in determining the appropriate remediation for groundwater. The goal of this approach is to return useable groundwater to their beneficial use within a timeframe that is reasonable, given the particular circumstances at the Site. Given the fact that the groundwater at the Site is class II, an existing or potential source for drinking water, EPA generally uses the standards established under the Safe Drinking Water Act of more stringent state standards to establish the remediation goals.

Comment: One citizen asked what would happen if water seeped into the lagoons, whether it would be contaminated, and what would be done with the water.

EPA's Response:

Water entering the lagoons currently either evaporates or percolates down into the subsurface. The goal of the operating ARS is to capture such water and treat it. The ROD indicates that interim measures will be taken as soon as possible to minimize the infiltration of surface water and migration of contaminants into the residual soils.

Comment: One citizen stated that groundwater flow information is inaccurate and explained that contamination from the landfill could be drawn into Assabet Wells No. 1, 2, and 3 if the landfill were left uncovered or if there was a failure of the landfill cap.

EPA's Response:

The remedy selected in the ROD calls for capping the landfill and capturing and treating all groundwater flow in the landfill vicinity. The GPs are confident that the hydrogeologic regime in the vicinity of the landfill is understood so as to properly design and install the Industrial Landfill Groundwater Recovery System, and continue to monitor the groundwater.

2. Soil Contamination and Sludges

Comment: One resident requested that EPA establish soil cleanup goals for compounds in addition to the indicator compounds. The resident requested that EPA conduct a risk assessment to evaluate risks posed by compounds that would not be specifically addressed by soil cleanup goals.

EPA's Response:

Appendix D to the Phase IV Report (in particular chapter 2) includes an extensive discussion of contaminants detected at the WRG site and the selection of indicator chemicals. The GPs carefully reviewed the risk assessment provided by WRG and found a number of problems with the approach, which the GPs corrected through completion of supplemental studies by EPA, DEP, and their consultants. The term Soil Cleanup Goals is intended to refer to indicator compounds or any other compounds that EPA and DEP determine are not adequately addressed by the currently selected indicator compounds.

Comment: WRG reported concern about the potency factor of 1.4×10^{-2} used for calculating the soil cleanup levels for BEHP because reliable reports reference a potency factor of 8.36×10^{-3}.

EPA's Response:

The carcinogenic potency factor of 1.4 x 10-2 $(mg/kg/day)^{-1}$ is found in the 1989 U. S. EPA Health Effects Assessment Summary Tables - FY89, Office of Research and Development, U.S. EPA, January 1989.

Comment: One Town of Acton representative requested that EPA use laboratory column leaching tests to verify the leachate contaminant concentrations following soil excavation and cleanup.

EPA's Response:

The Soil Cleanup Goals were generated by EPA using a model developed by W. R. Grace and their consultants. The model and the calculations for establishing the Soil Cleanup Goals are described in Appendix A to this ROD. The EPA and DEP have reviewed this model and believe that it is a reasonable tool for developing appropriate Soil Cleanup Goals. The EPA does not believe it is necessary to conduct laboratory column leaching tests to verify the leachate contaminant concentrations.

Comment: An ACES representative stated that xylene is found in the Primary and Secondary Lagoons and asked where this chemical comes from and what effect it can have on people and the environment.
EPA's Response:
A review of interrogatories provided in 1980 by WRG indicates a number of industrial chemical manufacturing operations discharged to the primary and secondary lagoons over time. It is likely xylene, a common solvent, was used in the manufacture of certain products by solvent polymerization; another possible source was the container sealing compound manufacturing. Xylene has been shown to be fetotoxic in rats and mice. In humans, exposure to high concentrations of xylenes adversely affects the central nervous system and aggravates mucous membranes.

Comment: One resident was concerned about chloride emissions from the landfill.
EPA's Response:
The ROD indicates that to attain Massachusetts ARARs found in Massachusetts Regulations 310 CMR 19.00 (Solid Waste Regulations) and in 310 CMR 7.00 (Air Quality Control Regulations), emissions from the Industrial Landfill vents will be controlled utilizing best available control technology (BACT). It is anticipated that BACT will eliminate any discharge of contaminants to the ambient air.

Comment: One citizen asked if metals and phthalates are permanently located in the unsaturated soils just below their source lagoons, and what assurances there are that these compounds will not migrate to groundwater, and if future monitoring is scheduled for these contaminants.
EPA's Response:
Metals and phthalates are located in both wastes and soils at the Site; confirmation sampling will include analysis for other compounds including heavy metals known present at the Site. Confirmation sampling will seek to confirm the remediation plan to use indicator compound soils cleanup goals to assure all contaminant levels are reduced to acceptable levels protective of human health and the environment. The ROD includes a commitment to perform additional remediation to attain cleanup objectives if compounds other than the indicator compounds are identified in the soils. In order to achieve this, confirmation sampling will likely include all contaminants known present at the Site.

3. Miscellaneous

Comment: An ACES representative, referring to Appendix A, on page A7, 1.3.1.1 of the Phase IV Report, asked what the contaminants of concern are and how they were determined.
EPA's Response:
The contaminants of concern or indicator compounds for groundwater are listed in Table 1 of the ROD. The number of contaminants detected at many Superfund sites is often too large to quantify all possible health risks. Thus, a subset of these compounds known as contaminants of concern or indicator compounds, is selected to serve as the focus for further risk calculation efforts. They are selected based on those that are likely to contribute most to the overall risk. Selection of contaminants of concern is based on concentration, toxicity, frequency of detection, sample location, and the chemical and physical properties of the compound which determines its environmental fate and transport.

Comment: An ACES representative cited Figure 4.2.5 of the Phase IV Report and requested a similar figure for each contaminant.
EPA's Response:
Figure 4.2-5 illustrates groundwater contamination in the vicinity of the Industrial Landfill. Groundwater contamination is an issue the GPs will evaluate under OU Three. It is not addressed in the source control proposed plan.

Comment: One citizen stated that CDM's analysis of chemicals at the W.R. Grace site contains distortions and errors and fails to mention the styrene in the ground, and the oil and hexane which is currently leaking on-site. The citizen also stated that, to date, WRG has collected more oil and hexane than they have ever admitted is present on-site.
EPA's Response:
The absence of discussion of the Styrene release and Styrene tanks closure at the WRG Acton site in the Phase IV Report is considered appropriate by the GPs in view of the fact that the Styrene problems have been addressed previously in separate actions conducted by the GPs. Three Styrene tanks were operated by WRG between 1950 and 1981. In 1986, WRG prepared a plan to close these tanks by dismantling the aboveground tank and filling the two subgrade tanks containing hardened polystyrene with sand and concrete. The GPs studied the styrene issues carefully and concluded the nature and form of the polystyrene present, and the containment of the polystyrene during a rapid polymerization event within the tanks was supportive of the plan to handle

this environmental issue as proposed. The oil and hexane releases were terminated in the early 1980s and recovery and monitoring was instituted to address these releases that are physically separate and distinct from the problems addressed in the proposed plan. The GPs are confident the oil and hexane releases are being addressed via remedies already in place.

Comment: A Nashua, New Hampshire resident and a New Hampshire journalist asked whether or not there are any waste products from the W.R. Grace facility in Nashua, New Hampshire which were placed in the landfill at the W.R. Grace facility in Acton, Massachusetts and if so, requested a list of which specific contaminants Nashua might have contributed.

EPA's Response:
For a period during late 1977 and early 1978, a few truckloads of manufacturing by-product waste containing ammonia produced at Grace's facility in Nashua, New Hampshire were disposed of in the Secondary Lagoon.

Comment: An ACES representative referred to Chapter IV of the Phase IV Report, which states that only two chemicals will be addressed. The representative asked why these two chemicals were singled out and requested a list of the chemicals, ranked according to level of risk, which have been used since 1970 (and earlier, if available).

EPA's Response:
Appendix D to the Phase IV Report (in particular chapter 2) includes an extensive discussion of contaminants detected at the WRG site and the selection of indicator chemicals. The GPs carefully reviewed the risk assessment provided by WRG and found a number of problems with the approach, which the GPs corrected through completion of supplemental studies by EPA, DEP, and their consultants (June 1989 Risk Analysis of the W.R. Grace Site). EPA has indicator compounds for this source control operable unit. EPA does not believe it is necessary to evaluate all the chemicals found at the Site. The number of contaminants detected at the Site is often too large to quantify all possible health risks. Thus, a subset of these compounds known as contaminants of concern or indicator compounds, is selected to serve as the focus for further risk calculation efforts. They are selected based on those that are likely to contribute most to the overall risk. Selection of contaminants of concern is based on concentration, toxicity, frequency of detection, sample location, and the chemical and physical properties of the compound which determines its environmental fate and transport.

C. Comments Regarding Bioremediation

Comment: Several citizens and ACES representatives suggested that EPA give careful consideration to bioremediation to treat contamination at the W.R. Grace site. They referenced several studies supporting bioremediation of certain compounds. They also referenced Appendix G of CDM/Grace Phase IV Report and felt that this information supported the use of bioremediation as a remedial approach. They recognized that the appendix discusses only aerobic biodegredation and asked about anaerobic biodegredation. They also asked if biodegradation could be utilized in the other waste areas with the consideration of adding nutrients or "farming" the wastes.

EPA's Response: The GPs have carefully considered the role of biodegradation at the WRG site. Biodegradation will likely occur for some contaminants at the W.R. Grace site; however, some of the predominant contaminants which the GPs are most concerned about (vinyl chloride and VDC), as well as other Site contaminants, are unlikely to be biodegraded. Conditions for biodegradation are limited and time rates for contaminant reduction to Soil Cleanup Goals are unknown.

The EPA recognizes that numerous studies and applications have demonstrated the biodegradability of nonhalogenated compounds such as benzene and toluene; however, the chlorinated compounds such as VDC and vinyl chloride are only marginally biodegradable. Vinylidene chloride is one of the most predominant contaminants at the Site. Therefore, predictions of degradation of these compounds is not useful for mitigation of the bulk of Site soils contamination.

Biodegradation of the soil contaminants in the plume of migrated contamination at the Site has been the subject of a limited study performed by CAA under contract to WRG (Appendix G). The EPA reviewed the results of the studies when the data became available in May and October 1988. Concerns focused first on the limited number and class of contaminants for which biodegradation was investigated. Notably, VDC and vinyl chloride were not investigated.

Secondly, the Grace study only assessed aerobic degradation. Aerobic metabolism of organics is much faster than anaerobic degradation due to the biochemistry of the process. The study also confirms that the rate of aerobic degradation is widely variable and dependent on the concentration of oxygen. The study indicates groundwater oxygen levels below the landfill are within the range of significantly reduced biodegradation (P.13 of Appendix G). The EPA believes that for the majority of the contaminated soils at the WRG site, anaerobic conditions will be probable, and oxygen levels will limit the rate of biodegradation. Amendment of soils with oxygen in unsaturated zones will likely enhance partitioning of volatiles to soil gas (volatilize them to the air), rather than enhance biodegradation.

Thirdly, the rate of biodegradation curves presented in the report indicate that as substrate (i.e. biodegradable contaminant) concentration decreases, so does the rate at which it is decreased. Extrapolations to the zero ppb level are from the hundred ppb level, and are hypothetical. EPA is concerned about biodegradation being able to achieve Soils Cleanup Goals in a measurable time frame.

Considering landfarming, the elevated concentrations of contaminants within the contaminated sludges present at the majority of waste sites presents a more severe environment unfavorable for microbes than in the soils. Landfarming of contaminated soils will also promote volatilization of contaminants in addition to biodegradation. Such intermedia transfer is undesirable.

In summary, a bioremediation remedy is subject to feasibility limitations of the bioremediation technologies due to the concerns presented above primarily due to the presence of chlorinated organics resistant to biodegradation. Concentrations of contaminants in wastes may be toxic to microbes. Active landfarming biodegradation techniques will promote intermedia transfer of soils contaminants to the atmosphere. Reviews performed by the EPA and their contractors have not supported the further investigation of this approach.

D. Comments Regarding Public Involvement

Comment: A resident commented that thirty days was an insufficient amount of time for public comment prior to a Record of Decision, and quoted a Special Report of the Office of Technology Assessment on Superfund Implementaton entitled "10 Case Studies", which contends that pressure to complete RODs by the end of the fiscal year can lead to poor cleanup decisions.

EPA's Response:
EPA is required to conduct a 21-day comment period prior to reaching a Record of Decision to address Site contamination. EPA recognizes that the 21-day period is relatively brief and therefore extended the comment period for the W.R. Grace site to 32 days. EPA has also addressed the issue of time limitations by making technical documents available for public review through the Acton Town Hall and Public Library as they have been completed. EPA also held a public meeting

on the draft Phase IV Closure Plan in December 1988 to familiarize the public with the draft plan and allow opportunity for pubic comment. The draft plan was therefore available for more than six months prior to the beginning of the formal comment period.

Additional efforts were made to supply the Proposed Plan summarizing the Site history, results of technical studies, options for remedial action and the preferred alternative, to over 500 people on the Site mailing list. Other actions to inform and involve the public are listed in Attachemnt A of this document. Based on the fact that these actions have provided enhanced opportunity for review and comment on documents, EPA determined that the comment period was adequate and meets all statutory obligations for allowing opportunity for review and comment.

EPA also notes that the Office of Technology Assessment report presents general conclusions that are not based on consideration of the history of community and Town of Acton involvement over a period of years in EPA decisions concerning the W.R. Grace site. EPA has based its cleanup decision on years of study and considered evaluation with input from the Town of Acton, and does not consider its decision rushed or flawed.

Comment: One resident stated that because EPA does not evaluate community acceptance as part of the development of a preferred alternative, it is not given equal weight with other evaluation criteria, such as cost effectiveness, identified in the Proposed Plan.
EPA's Response:
EPA evaluates community acceptance principally based on comments received during the public comment period. Public comments are carefully considered prior to any final decision on Site cleanup. EPA presents its preferred alternative at the start of the public comment period to help the community understand and focus comments on that preferred alternative. The public, however, has been encouraged to comment on all alternatives given detailed screening in the Phase IV Closure Plan, since none of the alternatives evaluated in detail are definitively rejected until public and State comments have been considered.

The nine criteria, including public acceptance, are not assigned individual weighting factors during evaluation of remedial alternatives. EPA balances the criteria to develop a remedy that provides overall protection of human health and the environment.

Comment: One resident asked that copies of the ROD and

Responsiveness Summary be sent to newspapers in Acton.
EPA's Response:
An announcement and brief summary of the ROD will be published as a paid public notice in the Middlesex News. Copies of the complete ROD and Responsiveness Summary will be available at the Acton Public Library and at EPA headquarters in Boston. Copies will be supplied through the EPA Public Affairs Office in Boston upon request.

Comment: One resident asked if the ROD can be changed after it is signed.
EPA's Response:
The ROD can be changed after it is signed. The process for making changes can be found in an EPA guidance document entitled "Interim Final Guidance on Preparing Superfund Decision Documents" (OSWER Directive 9355.3-02).

E. General Comments

Comment: One ACES representative asked what specific health and safety standards EPA could guarantee Acton citizens over the next several decades. The representative asked EPA to be as specific as possible regarding the standards that would be maintained.
EPA's Response:
EPA will ensure that the remedy is fully protective of human health and the environment. EPA will review the Site at least once every five years after the initiation of remedial action at the Site to assure that the remedial action continues to protect human health and the environment, in accordance with Section 121(c) of CERCLA. EPA will also evaluate risk posed by the Site at the completion of the remedial action (i.e. before the Site is proposed for deletion from the NPL).

Comment: An ACES representative asked what the ambient air will be like if CDM's option is used.
EPA's Response:
Ambient air at the time of remedy implementation is a concern that the GPs have taken into consideration during formulation of the proposed remedy. The potential for release of volatile contaminants to the atmosphere represents the greatest risk of air pollution during the remediation. This has been addressed in the proposed plan under the VFL stabilization process description, which includes a discussion of controls to be used on the mixing equipment to capture and treat off gases. In addition, existing releases from the ARS air stripper would be controlled by installing a control device to treat these

emissions as described on page 15 of the proposed plan. Finally, the releases of gases from the vents in the landfill will be carefully evaluated and best available control technology applied to control releases, as described on page 15 of the Proposed Plan.

Comment: One Town of Acton representative indicated that EPA's risk analysis did not include an evaluation of potential risks to the environment, and questioned whether these potential impacts have been adequately addressed. The commenter also asked that the potential exposure pathways and associated risks that were evaluated in CDM's Phase IV Baseline Risk Assessment be presented. The commenter requested the definition and identification of all exposure points, and specifically asked that air be added as an exposure media.

EPA's Response:

The Town of Acton is correct in indicating that the EPA Risk Analysis (Prepared, June 1989) does not evaluate the potential risks posed to the environment by the release of contaminants from the W.R. Grace site. However, EPA notes that the selected remedy has been developed with both human and environments protection in mind. See the remedial action objectives section of the ROD. Actions taken to limit and protect human exposure will also serve to limit and protect environmental exposure. Although an extensive analysis of baseline risks to the environment has not been conducted, the proposed remedy will provide protection to public health and the environment.

Air has been considered as an exposure media at the W.R. Grace site. In fact, EPA has conducted a risk assessment which evaluated the risks associated with exposure to contaminants released from the air stripping tower (considered to be the primary source of airborne contaminants). The results of the assessment did not indicate that a risk to human health was posed by these emissions. Further, during the source control remedial actions, air emissions will be controlled in compliance with air ARARs as well as to protect workers on-site. These controls will effectively limit exposure pathways to both human and environmental receptors. The source control remedial measures will also minimize contribution from the overlying soil to the groundwater. Therefore, the amount of groundwater contaminants requiring treatment via the ARS treatment system will continue to decline, which in turn will lead to a continued reduction in VOCs at the tower.

Further, the remedy will serve to eliminate the potential for release of contaminants through: immobilizing volatile contaminants (stabilization and capping); covering any area which attains the Soil Cleanup Goals; elimination of exposure pathway (capping); and the removal of highly contaminated soils from the Site (incineration).

Comment: One resident asked what is in the trucks that are travelling on Parker Street and what would happen if there is an accident in this residential area.
EPA's Response:
EPA is interpreting the comment to be asking what will EPA do to ensure that the trucks leaving the Site containing Superfund wastes obey all safety requirements. These trucks are subject to Department of Transportation regulations packaging, placarding, and safety requirements. These vehicles are subject to regulation by local police authorities.

IV. REMAINING CONCERNS

Issues raised during the public comment period that will continue to be of concern as activities at the Site move into the RD/RA phase are summarized below, along with EPA responses.

Comment: One resident asked what opportunities there would be for public review of remedial plans during the Design Phase and if residents would be given an opportunity to see if the design data responds to their questions and concerns.
EPA's Response:
The GPs are committed to involving the public during the design phase of the remedial action. Documents developed during the design phase will be reviewed by EPA and DEP and discussed with the public for their comment and input.

Comment: Commenters asked how ACES' TAG advisor will be involved in future remedial design meetings and other meetings associated with the cleanup at the Site and how EPA plans to incorporate the findings of ACES' TAG research during the design phase.
EPA's Response: The role of the technical advisor chosen by ACES under the TAG program will be determined by ACES, since this advisor will report directly to ACES during the remedial design and construction phase. EPA will continue to conduct public meetings or other forums in which representatives of the public may discuss concerns with the GPs. In addition, individuals and groups, as well as their advisors, with concerns about the Site or the Superfund program in general, are encouraged to call or write the EPA Remedial Project Manager, Wayne Robinson, or the EPA Community Relations Coordinator, Diane Ready.

Comment: One citizen remarked that bringing 350 truckloads of sand, soil and other materials to the Site will take six months and create noise and traffic problems for residents in the area. The citizen asked EPA to consider reactivating the train system to handle this traffic.
EPA's Response:
The GPs have considered the truck traffic issue and have concluded additional truck traffic (approximately 3 trucks per day) can be accommodated without significant impact. Train transport of materials has not been ruled out, but it is unlikely to prove economically competitive for transport over the short period of remedial measures implementation.

Comment: One resident asked how often the Site will be tested once cleanup has been initiated. The resident also asked whether test results would be available to the public and where they would be located.
EPA's Response:

Progress reports will be required from WRG by EPA and DEP as the construction of the remedy progresses. Copies of these reports will be forwarded to the Town Manager.

Comment: One citizen urged that EPA require adherence to strict air monitoring standards during VFL mixing and emission control operations.
EPA's Response:
The GPs have focused on the volatilization of contaminants from the sludges and soils solidified via the VFL process. The concern has been expressed to W.R. Grace that releases from these wastes must be controlled, that is, they must be captured and treated. The ROD indicates that the mixer will be enclosed and vented to an emission control system, probably activated carbon, that would prevent emissions to the ambient air during the process step.

Comment: Commenters requested that on-site and perimeter air-monitoring be required during sludge excavation and solidified sludge placement operations and asked that contingency plans regarding air emissions be in-place prior to commencement of excavation. The commenter also stated that a backhoe, rather than a dragline, should be used for sludge excavation to minimize repeated sludge handling, particularly for the primary lagoon where "wet" sludges still remain. The commenter added that using a dragline may not minimize liberation of pore fluid and mixing of excavated materials with the remaining sub-base materials.

EPA's Response:
These issues will be developed in detail during the design phase of the remedial response. EPA intends to implement an air monitoring program (on-site and perimeter monitoring) during Site remediation activities, especially during excavation operations. Additionally, contingency plans will be developed. EPA will consider a backhoe for excavation during the design phase to minimize the liberation of pore fluid into the subbase during excavation activities. EPA agrees that strict monitoring standards should be established and adhered to during the VFL mixing operation.

Comment: One resident asked who will test water for further contamination, and if EPA would be testing, what private, objective party would also be testing. The resident also asked what method will be used to test the water.
EPA's Response:
EPA will require WRG to collect and arrange for analysis of groundwater samples at an independent lab in accordance with EPA approved methods.

Comment: One resident asked what measures are planned in the event that monitoring shows actual results are poorer than predicted.
EPA's Response:
In the event monitoring indicates the remedy is not performing as planned, the GPs will evaluate the results and determine an appropriate corrective measure for the diagnosed shortcoming.

Comment: One resident asked what plans EPA has for restoring the lagoons and pits that will be excavated.
EPA's Response:
If the confirmation sampling data indicate these areas have residual contamination below the soils cleanup goals and are at levels ensuring protection of the public health and the environment, the excavated areas will be graded, covered with a minimum of six inches of clean top soil and seeded or vegetated to establish and support growth to control erosion.

Comment: An ACES representative asked that all materials brought to the W.R. Grace site for remediation be monitored for content and place of origin.
EPA's Response:
The ROD requires clean fill be used for construction of cap layers above the barrier layer; specifications for clean fill determinations will be developed during the design phase of the remedy.

Comment: One resident asked when flushing of the Primary Lagoon would begin. The commenter asked who is responsible for developing the cleanup schedule and specifically requested the timeframe for soil sampling, analysis, excavation and flushing activities.
EPA's Response:
The flushing of the Primary Lagoon will only occur if residual contamination exceed Soil Cleanup Goals set for the Primary Lagoons; therefore, a specific time cannot now be established for this activity. The GPs are responsible for assuring W.R. Grace complete all remedial measures necessary at the W.R. Grace site. The timetable for remedial activities will be determined during design phase of the remedy.

ATTACHMENT A
Community Relations Activities Conducted at the W.R. Grace Superfund Site

- August 30, 1984 - EPA issued a press release to announce a Public Meeting regarding the Aquifer Restoration System (ARS).
- September 12, 1984 - EPA and DEP held a Public Meeting regarding the ARS.
- October 22, 1984 - EPA issued a press release regarding the ARS approval.
- December 1988 - EPA conducted a public meeting to present the draft Phase IV Report to Acton residents.
- February 24, 1989 - EPA placed a public notice in the Middlesex News describing the Technical Assistance Grant (TAG) program and announcing receipt of a notice of interest to apply for a TAG from the citizen group Acton Citizens for Environmental Safety.
- May 1989 - EPA and the MA DEP met with residents of Acton to discuss opportunities for public involvement at the site.
- July 19, 1989 - EPA delivered Administrative Record to site for public review.
- August 9, 1989 - EPA issues a press release and paid public notice in the Middlesex News announcing 1) availability of the Phase IV closure plan and EPA's Proposed Plan for addressing sources of site contimination; 2) availability of the Administrative Record for public review; 3) EPA's schedule for a public informational meeting and informal public hearing on the Proposed Plan; and 4) schedule for public comment period.
- August 10, 1989 - EPA released the Proposed Plan to address sources of site contamination to the public through the site mialing list of approximately 500 interested and affected parties and through the Administrative Record.
- August 14, 1989 - EPA delivered Addendum to Administrative Record.
- August 14, 1989 - EPA conducted a Public Informational Meeting to present the Phase IV Report and the Proposed Plan and answer questions.

- August 15 - September 15, 1989 - EPA held a Public Comment Period to solicit citizens' comments regarding EPA's preferred alternative for addressing contamination at the W.R. Grace site.

- August 23, 1989 - EPA issued a press release announcing the awarding of a Technical Assistance Grant (TAG) to the Acton Citizens for Environmental Safety.

- September 12, 1989 - EPA held a Public Hearing to accept oral comments on the Phase IV Report and Proposed Plan to address sources of site contamination.

ATTACHMENT B
September 12, 1989 Informal Public Hearing Transcript

UNITED STATES OF AMERICA
ENVIRONMENTAL PROTECTION AGENCY
BOSTON REGION

In the Matter of:

PUBLIC HEARING

W. R. GRACE SUPERFUND SITE
PROPOSAL PLAN

Town Hall
Acton, Massachusetts

Tuesday
September 12, 1989

The above entitled matter came on for hearing, pursuant to Notice at 7:35 o'clock p.m.

BEFORE: MERRILL HOHMAN, Director
Waste Management Division
Environmental Protection Agency
J.F.K. Federal Building
Boston, Massachusetts 02203

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Waste Management Division
New England Region EPA Office

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Richard McAllister, EPA Office of Regional Counsel

Ed Benoit, Central Regional Engineer for Waste
Site Cleanup, Mass. Dept. of Environmental Protection

Richard Boynton, EPA Project Supervisor

Diane Ready, EPA Community Relations Specialist

ORAL COMMENTS: 11

P_R_O_C_E_E_D_I_N_G_S

7:35 p.m.

MR. HOHMAN: Good evening. Can everyone hear? Is the microphone on okay? Again, good evening and welcome. My name is Merrill Hohman. I'm the Director of the Waste Management Division for the New England Region of the United States Environmental Protection Agency with the office in Boston, Massachusetts.

My staff and I are responsible for implementing the Federal Superfund Program here in New England, and I will serve as the presiding officer for tonight's hearing.

Let me introduce to you the people that are up here with me on the hearing panel. On my immediate right is Wayne Robinson, who is the EPA Project Manager for this site. To his right, Richard McAllister, an attorney with EPA's Office of Regional Counsel. On my immediate left, Ed Benoit, Central Regional Engineer for Waste Site Cleanup with the Massachusetts Department of Environmental Protection. Next to him is Richard Boynton, EPA's Project Supervisor for this particular site. And at the door, we have Diane Ready, who is EPA's Community Relations Specialist that is assigned to this site.

The purpose of this hearing tonight is to formally accept comments on EPA's proposed plan for addressing the sources of contamination at the W.R. Grace Superfund Site here in Acton. EPA held a public information meeting to talk about our various alternatives here on August 14, 1989. At that meeting we described the decision provess and the contents of EPA's proposed plan, and then had an opportunity for general questions and answers and discussion with the audience.

A more formal public comment period began August 15 and will end on September 15, 1989.

Before I actually begin the hearing, I want to talk a little bit about the format that we will follow. Essentially, the evening agenda will begin with a brief presentation by Wayne Robinson just to review for everyone what EPA's plans are, or the proposed plans for this site.

Following that presentation, I am then going to provide an opportunity to W.R. Grace Company to provide comments. Following that, we will proceed to accept any oral comments any of you may wish to make for the record.

I want to point out that this hearing is an opportunity for EPA and for the state to listen to your comments and concerns with respect to our proposed cleanup plans. Because it's a hearing, we will not be getting into discussions, nor will we be trying to answer your questions tonight. Instead, after the comment period all of the comments that we receive from the public, whether they be orally tonight or whether they come to us in writing, will be addressed in EPA's record of decision. asnd part of that document includes something called a responsiveness summary, which is a bureaucratic way of saying here are the comments that we got from people, and here is EPA's response to those comments. So that will become part of the record.

Once all of the formal comments have been entered into the record tonight, then we will close the public hearing. I think at that point, at least some of EPA's staff will stay. If you have questions or things you want to ask or clarify, feel free to contact them and discuss it with them. And then, hopefully, that will enable you to provide written comments to us with your opinions on the proposed plan. And again, those written comments must be sent to us by September 15th.

Now, for those of you who wish to testify tonight or wish to comment, you should have indicated your desire to do so when you came in the door by filling out the registration form available from our representative. If you have not registered to sign up to speak, then you will not be called, at least during the early part of the evening.

I will call on those of you who have signed up to make a statement in the order in which you signed up. I would also acknowledge or recognize that some of you may have personal commitments or problems. And if you do have, speak to Diane Ready at the door, and we'll try to squeeze you in out of order if there is some pressing need for you to be somewhere else as well this evening.

When we call upon you, I would ask, since we are having a transcript of this hearing, I would ask that you come up to the microphone up here, identify yourself, your name, where you come from, and comment speaking into the microphone so that we can have a good record of all your comments.

We do have a number of speakers that have signed up already. So I do ask that you limit your comments to not more than ten minutes. If you have a formal presentation that you want to make that is going to take more than ten minutes, I would respectfully ask that you summarize it in ten minutes or less and submit to our reporter over here the complete document. And the complete document then will be put into the record.

Again, I would encourage you also to submit written comments if you have any, or at the conclusion of tonight's hearing. And again, I want to remind you those comments must be postmarked no later than September 15, 1989 and mailed to our office in Boston. The appropriate address can be found in the proposed plan that was circulated. And I believe there are additional copies of that proposed plan at the registration desk if any of you need them.

Are there any questions on how we are going to run the hearing? I should add that we won't have any formal question and answer discussion. But the members of the panel up here may ask you after you complete your statement--they may have some questions simply to clarify our understanding of what you are saying, what your position is. So I hope you will bear with us and not mind answering our questions, although during the formal period we will not answer yours.

Any questions on the format? Okay. Then what I would like to do is to begin by calling on Wayne Robinson, the project manager, to give a very brief, not more than ten-minute I hope, Wayne, overview of the proposed plan for the W.R. Superfund Site in Acton. Wayne?

MR. ROBINSON: Thank you, Merrill. My description of the preferred alternative will be pretty brief. And again, it's the preferred alternative to clean up the sources of contamination at the site.

The first part of the remedy will be to excavate the material from the primarily lagoon, secondary lagoon, and emergency lagoons. All the sludge will be excavated, and an additional two feet of soil underneath the sludges will be excavated. This material will then be solidified and stabilized by the VFL process and then placed on the existing industrial landfill.

Additionally, material from the north lagoon will be removed. This material will be removed to a depth of at least the low groundwater table, and this material will also be solidified and placed on the industrial landfill.

Also, material from the blowdown pit will be removed. The first part of this process will be to excavate all the material with contamination above 100 parts per million of venyldine chloride, or VDC. This material will be excavated and taken to an off-site incineration facility for treatment.

After that's done, all the remaining sludges and an additional two feet of soil underneath the sludge will be removed, solidified and placed on the industrial landfill.

The other waste areas on the site will also be excavated. These include all three Battery Separator Lagoons, the Tank Car Area, and the Boiler Lagoon. These areas will be excavated to a depth of five feet and placed unsolidified on the landfill.

After all this excavation is complete, there will be a comprehensive sampling of the excavated areas. The purpose of this sampling will be to determine if we have attained the established soil clean-up goals for those spots. These soil clean-up goals were developed for indicator compounds which if left in each disposal area as a residual, will not lead to contamination of ground water at levels that exceed drinking water standards.

If our sampling indicates that we have indeed attained the soil clean-up goals for the waste areas, then those areas will be properly graded and seeded. However, if our sampling indicates that the clean-up goals, soil clean-up goals have not been attained, then we will take the following actions.

The first step will be to look at the sampling and analysis that was done and determine what is the best available technology to attain these soil clean-up goals. We will make this decision based on the nature and percent of contamination that we just found from that sampling, along with the nine-point EPA evaluation criteria.

This decision process on deciding on the next technology or remedial action to attain the soil clean-up goals will be the same decision process as we're discussing today for the future rod. That is, it will be a very similar rod process.

To address the industrial landfill, no contaminants from the industrial landfill will be excavated. The landfill will be closed with an impermeable cap designed and constructed in accordance with Massachusetts hazardous waste regulations for hazardous landfills. This impermeable cap will include a synthetic cover to prevent the infiltration of waters into the landfill. This cap--I'm sorry. The landfill will also have vents in it. These vents will take contaminants from inside the landfill to the surface, where they will be collected and treated.

Additionally, a ground water recovery and monitoring system will be installed around the landfill. This system will be used to supplement the existing aquifer restoration system in that area. And that system will be installed before any remedial activities are conducted at the landfill.

The Battery Separator Chip Pile will be closed as a solid waste landfill with an impervious cap in accordance with the Massachusetts solid waste regulations. The aquifer restoration system, airstrip and tower, will be upgraded by installing additional treatment. It is anticipated that this treatment will be carbon absorption.

Additionally, there will be a comprehensive site-wide ground water monitoring plan implemented to evaluate the effectiveness of the selective remedy. This groundwater monitoring plan will be developed during the design of the remedial action. Under this plan, groundwater monitoring compliance wells will be installed, both upgradient and downgradient of the disposal areas--again, to evaluate the effectiveness of the source control actions that we have taken.

So in summary, the future remedial steps that we will be conducting are to address the source areas that exist on the site. That will be by the process I have just describe in implementing the rod.

The next step of the process will be, if the soil clean-up goals have not been attained and we determine what the best technology is to attain those soil clean-up goals and have a similar decision-making process to decide on that remedy, that process would include input from the community.

And then the last step of the process will be to determine if all the groundwater is being adequately addressed by the existing aquifer restoration system. And if not, additional groundwater actions will be taken. Again, the decision on this last portion of the remedy will have you all available for input and comment.

So in conclusion, I would like to just stress that again, this is a remedy to clean up the sources at the site. And it's not the groundwater remedy. And also, we recognize that there are many design issues to be determined during the process. And the EPA is committed to understanding and evaluating and taking into consideration your input during that design process. Thank you.

MR. HOHMAN: Thank you, Wayne. I'd like now to call on W.R. Grace. They have a representative here who wishes to make a statement for the record.

MR. WILKIE: My name is Russ Wilkie, and am a Vice President with the Polyfibron Division of W.R. Grace & Co.

Thank you for coming out this evening to comment on the plans for the Acton site.

Slightly over ten years ago, Grace's Acton site was found to be a major contributor to the contamination of Assabet Aquifer, which forced the closing of the town wells.

Discovery of a contaminated water supply was a difficult time for you, your neighbors, for the entire community. It was also a difficult time for those of us at W.R. Grace, many of who live or work in Acton. We would like to take this opportunity to express our regret for the hardship we have caused you and the community. The fact is, we at Grace have made a number of mistakes in dealing with the town aquifer, and we realize that we cannot simply erase those mistakes. We must prove our commitment to protection of the Town of Acton.

We have taken full responsibility for the clean-up of the Acton site and the pollution of the aquifer. We have put substantial resources into this clean-up effort, utilizing the best technology available--even developing some new technologies. The results show that the system is working. The aquifer is being cleaned up. We will continue to work at the cleanup in a responsible and professional manner.

Grace believes that the site closure plan that has been presented represents a positive step forward. You, the town officials and private citizens, have contributed to this plan. And while it may have not been easy for anyone, we believe it is a good plan.

We hope that the implementation of this plan will be a significant step toward improving the relationship between Grace and the Town of Acton. Grace sincerely wants to be more than just physically located in Acton. We want to be an asset to the community. We hope to move forward to a future characterized by an honest and open relationship between the people of Grace and the people of Acton.

I would like to close by thanking the EPA, the DEP, and the Town of Acton for their professional approach and their cooperation. Thank you.

MR. HOHMAN: Thank you. I do want to break the order, and we will make an exception to any elected public official that shows up during the evening. The first one that has come in is Nancy Tavernier, who is Chairman of the Board of Selectmen of the Town of Acton. So I will call on her as an elected official.

MS. TAVERNIER: Thank you very much for that courtesy. The Town of Acton had been ably represented over the past ten or 11 years, or as long as the history of the W.R. Grace clean-up by special counsel Stephen Anderson, and by our consultants, GZA. In fact, these two entities represented the only continuity of experience in our entire town and in fact, in terms of the EPA and the DEP, town officials and the Grace officials, all other key players have changed in that time period. But we're fortunate that GZA and Steve Anderson have been with us throughout this process.

They have been submitting comments to the EPA ever since the--foreclosure plan was released. And they are prepared to submit final written comments by September 15th.

I just want to defer tonight to our counsel, Stephen Anderson, for any further comments that the town will be making.

MR. HOHMAN: Thank you. And now we will begin, in all of our list, are there any public officials that I don't know about?

(No response)

MR. HOHMAN: Okay, Prudy Piechota.

MS. PIECHOTA: Gee, I'm kind of sorry I am the first person to do this. But I happen to be from the city of Nashua in New Hampshire. We have a W.R. Grace facility in our front yard, as you have one in your back yard. Our facility is ongoing. I am a member of the LAPC in the City of Nashua. I am here to listen--pardon?

FROM THE FLOOR: What's the LAPC?

MS. PIECHOTA: LAPC is the--committee for emergency preparedness in the community. I have been very active in the environmental issues in the City of Nashua for over ten years. I worked on Gillson Road. I worked on evacuation plans for Gillson Road. Also, I am now in the process of looking at W.R. Grace Nashuau for a cyanide contamination on the Merrimack River, which extends over a quarter of a mile.

We have approximately 11 sites that are scheduled for clean-up on this particular facility. I have some concerns over reading your documents in regards to the incineration of your waste product. I would like to know if it is all going to be incinerated here in Acton or if it is going to be carried back to Nashua to incinerate in their incinerator.

I would like to know if there are any products from the City of Nashua W.R. Grace that made it to Acton in your landfill and at your facility, for the simple reason that we should be good neighbors. And if our Grace facility in Nashua has done this, then we as neighbors in the community should reach out to one another and say, how many other facilities may have done the same thing?

And I certainly think that Grace Corporate, though maybe want to be up front and ongoing, I have received many--from this facility in Nashua. I cannot speak for after.

And unfortunately, I would like to hear a lot more comments from you folks because you have lived with this for

11 years. I have lived with Grace Nashua for seven years and have been very active there. So please, do not be afraid to contact me. My name is Prudy Piechota. My address is 25 Musket Drive, Nashua, New Hampshire. And my ZIP Code is 01013. My telephone number is area code 603, 880-7868. I am not a politician. I am not paid by industry or anyone else. I am an environmentalist. I have started the Greater Nashua Campaign Against Toxics. I am a founding member. I am also a member of the Greater New Hampshire Campaign Against Toxics, and I also belong to the Nashua Campaign Against Toxics, which represents this country and eleven other countries.

So your environment here is also our environment in New Hampshire. We are very, very much concerned. Please, feel free to contact me and talk about it. And I am here to observe, and I would like those questions answered in a written form, if you would like. I will submit to you a form. Thank you very much.

MR. HOHMAN: Thank you. Carol Holley.

(Pause)

MS. HOLLEY: My name is Carol Holley, and I am Acton resident in the--for 17 years. My questions are as follows. After the initial settlement is over, and the plastic cap is installed, how often will the settlement guages be resurveyed. And what is the trick that causes them to be defective?

How much differential settlement is allowable for visual inspection of the cap or a soil gas--is initiated? Will there be a lead--inspection scheduled annually? And will there be a written report submitted to the Board of Selectmen? Thank you.

MR. HOHMAN: Thank you. Charlotte Sagoff.

MS. SAGOFF: I had hoped to speak a little bit later than--after more questions were asked because I have a rather lengthy statement to read. Mainly in response to the answers from W.R. Grace to the August 14th meeting, as well as some comments with regard to the preferred alternative. I am going to try to summarize, and I am going to make it shorter than it really is in order to keep it in the time limit.

Many of the responses by Grace to questions raised in the August 14th public information meeting and in their June 1989 addendum to their 1988 Phase 4 report indicate that natural biodegradation occurs with or without a synthetic cover. We urge that you consider soil remediation on a larger scale, and with a changed, speedier schedule for the lagoons--landfill. Innoculation of the varieties of organisms, bacteria, fungi and yeast, plus and addition of nutrients like oxygen and nitrates, would speed up the natural processes.

The EPA should place more stress on bioremediation which can be used on so many different volatile organics, like contaminants at the Grace site. Also, it's cheaper for W.R. Grace, since that's a major concern.

We are concerned that the--process is uncertain, unproven and difficult to use with assurance on many varieties of materials. I have seen VFL toxilonic material which crumbles easily. That's that cement, lye, ash, lime--and the contaminents which will all be mixed together in order to make a solid, stable top to lay down on top of what's in the landfill now before the--. And I have seen it break down. It is possible that slabs of the so-called stabilized material may work for a while in the small setting.

But in an area as large and as irregular as an over four-acre landfill, the result is likely to be breakup. And thus, destruction of the Mill 60 synthetic membrane which Grace proposes to use. I have brought a chunk along of the membrane, a 60-mil membrane, which is very thick to go over an almost five-acre landfill, and which will on contact with broken edges of the VFL material, the--material, may very well be sheared and torn and punctured and ruptured.

EPA research indicates that organics can leach through the VFL material. I have read the EPA aquaduct annual research document, the 14th annual research documents. I mentioned that at the hearing on August 14th. Grace would be investing large amounts of money in an uncertain process. After everything is covered over, if the method doesn't function as they hope it will, more expense will be incurred to dig it all up and to do it all over again. Or more likely, it will be forgotten by Grace and just leech the materials into the groundwater, into the aquifer underneath.

There is a journal called the Environmental Report, which I am sure you all know of. Volume 18, number 40, pages 2079, of January 29, 1988 has a useful article on an EPA site in Chesawa, Delaware, called Poker's Landfill. There are two landfills there which have sludge contaminents comparable to the ones at the Grace Acton site. I refer you to case number EPA V3881EDC. Would you please read that article and the remedies used there and advise us in your response so that we consider it with our consultants, who we hope we will soon be able to hire.

If as Grace says their drums in the landfill are now empty and the material in the tank truck is solidified, that means that those contents have already leeched into the ground, where they are slowly travelling through the soil and/or other substances are there in perched layers.

We ask that you tap the flumes and extract the

VOC's before they reach the aquifer and the groundwater. These lagoon sludges and contaminated fluids, when covered up, would otherwise be forgotten. Research and practice in the biotechnology of soil organisms indicates that VOC's could be digested in the same way that bacteria in septic tanks digests and degrade septage. Even many of our medicines, like perimycin, come from soil organisms.

Grace, in it's September 1, 1989 letter of response to the comments on August 14th, stated that bacteria in average soil works to degrade and cleanse. They should add to what is already there naturally. VFL methods solidify pollutants, possibly only temporarily. And this would prevent soil organisms from working. The empty lagoons will have pollutants in the sandy soil underneath. Do not cover them. Add bioremediating bacteria, oxygen, and nitrate nutrients, and let the vatose layer cleanse itself.

They should use supplemental treatment instead of just covering the lagoons in pits and forgetting about them with grassy covers. Pits and lagoons should be degassed first before any other action is taken.

Areas like the lagoons, where sand will be excavated, will be drastically disturbed, requiring restorative planning. What are those restoring plans that you have for those lagoons and pits that will be evacuated and excavated? Grace refers only to a vegetated cover of grass.

Now, the only toxilanic VFL prototype that we know of at the Grace site exploded and failed. They got consultants, then continued to advise such stabilization. We have no evidence that it's workable. We would like in your response that you give us information where it works or has worked for 50 years.

There are so many contaminated pits and lagoons as well as the nearly five-acre landfill, that it should be possible to do some control prototype tests of proper soil remediation and soil stabilization for critiquing. Maybe a combination of methods should be used, not just the one described as the preferred alternative. You're putting all your contaminants in one basket. You're going to get some monsters out of that.

The EPA should demand on-site--capability for all the lagoons and pits as material is shifted. Then when we wait when the lagoons are excavated--while you are waiting for those lagoons all to be excavated, eight of them or nine of them with the blowdown pit, the groundwater will shift, will move faster, and it will be disturbed.

An analysis of each excavated site should begin immediately upon its excavation so that you can see what's underneath there now or at that point. Don't wait until all the sites are excavated for VFLing the polluted material, which is then to be placed on the landfill.

Grace speaks of disconnecting zones of perched water during the six-month wait for the fill and the VFL slude to subside, why not--into the area a combination of the--, yeast, fungi, whatever biological forms are available to adjust the VOC's. Feed them with oxygen and nitrate to speed the digestive process.

On page 20 of the June 8th addendum, when they dig out five feet of contaminated soil from under the back of the separator, the boiler lagoon and the tank car area, and they load it on top of the VFL sludge and label this clean fill--see attachment 2-2 in the Grace letter--this is typical of the double talk we have gotten for years. That stuff is not clean. They call it clean, saying that it's just going to be on top clean.

Similarly, page 20 of the June addendum, Grace is permitted to use the NCL maximum contamination levels and small level federal Walker standards. It's a very good acronym. But they are not stringent enough for Acton. We prefer our one-part per billion standard for a single volatile organic chemical with no more than five parts per billion for any more than one contaminent in our water.

We have paid extra money yearly for ten years to pay for the loss of our wells and the cleansing of our water. Grace should abide by the excellent standards considered appropriate by Acton's citizenry. Page 22 of the June addendum, let us know which on-site or off-site monitoring wells are at or above NCL values.

In attached--1 of the Grace response to the diagram showing the covered landfill, the stabilized sludge is drawn as a neat, solid block. It will not be a neat, solid block. Two uneven masses will be dumped, one onto the east landfill and one onto the west landfill. And then there is going to be another solidified mass to be dumped onto the ground between the ground that used to be for trucking.

All three will subside unevenly and will shatter eventually and break unevenly in different places because of the weight of the overburden--all the sand and soil and metal grain, etcetera. And tubing and venting.

We have been given no analytic data which would help us to understand how the VFL stabilized sludge will work. We cannot accept Grace's word without support data. At least 30,000 cubic yards of sand will be used to build the dome over the 60-mil liner. We want to know where each substance comes from that Grace will bring in.

In the past, Grace has dumped in contaminents from Nashua, Woburn and Cambridge, and possibly other places. All materials brought to the Acton site for remediation we want monitored for content and place of that origin. There are many types of fly ash from the incinerators, from cement kilns, coal burners, etcetera. You do not want any Grace produced fly ash used in the cover-up. We are told that all the materials being brought to the Grace property--the sand, the fly ash, the lime and cement will be in trucks. We insist that Grace begin scheduling their train transport again of these materials instead of increasing the burden on our roads and neighborhoods. Thank you very much.

MR. HOHMAN: Thank you.

(Applause)

MR. HOHMAN: Did you want to identify the organization you represent?

MS. SAGOFF: Oh, yes. This is -- that -- you said, that the selected -- DEQE then -- I know -- I now know it's the DEP thing, and EPA were the longest groups in this situation.

ACES, Active Citizens for Environmental Safety, were, also, in on this from the very beginning or since 19 -- about October, 1978. We've been listening to, and analyzing, and questioning, and critiquing stuff that we've been hearing.

So our organization is ACES. Thank you.

MR. HOHMAN: Bob Eisengrein?

MR. EISENGREIN: My name is Bob Eisengrein, I'm a citizen of Acton and, also, a member of ACES.

I have reviewed the CDM/Grace phase 4 reports, plus the addendum, in detail; the recommendations do meet one of the Federal law's criteria for a solution "to immobilize toxic waste".

However, if EPA and Grace will hearken to the citizens researched comments at the August 14, 1989 hearing, there still exists a real concern, and skepticism, that the recommended approach represents permanent immobilization. The toxic are still left in the earth, and are as potent as ever!

Federal law does state, with reference to toxic wastes "a permanent solution is preferred". From my review of all the reports submitted to EPA, there is virtually no reference to the use of an alternative solution, which "permanently reduces waste toxicity." Why?

Are there such choices? Certainly. ACES has published several reports and summaries of applicable bioremediation techniques, and cases where bioremediation has worked on Superfund sites like Grace's Acton site.

Bioremediation is a straight-forward process. It uses microbes already in the earth, which regularly degrade toxic into harmless byproducts.

Biodegradation can be accelerated by the addition of nutrients injected into toxic soil; CDM/Grace admits this in their reports, Appendix G! Yet no such alternative solution was presented!

Bioremediation gets to the root cause of citizens concerns; the impermanence of soil stabilization. Carefully selected bioremediation techniques can degrade the toxic into harmless byproducts -- toxic are not left in the ground. ACES has offered our resource material to EPA and CDM/Grace. The material includes not only references to costing less than soil stabilization, and a long term gain during the operation and maintenance phase since toxicity would decrease over time and require less maintenance monitoring.

Grace could proceed with the excavation design plans. The fundamental difference thereafter would be:

-bioremediation would take the excavated sludge, treat it, and produce harmless byproducts

-stabilizing the toxic would only "immobilize" them, leave them in the ground with the constant citizens concerns already expressed!

The above recommendations are not an emotional response to issues at stake, but a carefully researched effort. If neither of the above recommendations is accepted, one truly wonders if citizen input to the EPA process is meaningful.

Thank you.

MR. HOHMAN: Thank you.

Andrea Miller?

MS. MILLER: I'm Andrea Miller, an Acton resident, and I have a question and a comment.

I would like to know how many breaks and repairs at the Landfill Synthetic Cap would be permitted before the entire Cap would require replacement?

(Pause.)

MS. MILLER: I think that EPA should establish a performance criteria that assumes that for every break discovered there are at least two that are not detected.

EPA should require complete replacement of the cover, after every three or four repairs.

Thank you.

MR. HOHMAN: Micky Williams?

MS. WILLIAMS: I'm Micky Williams. I'm an Acton resident.

I have two comments. The first one is -- is fairly specific. I would like the EPA to require -- rates, to utilize the best available patrol technology to eliminate offense odors from the Stripping Tower. There have been decades of odor complaints -- mine included -- that have never been adequately addressed or the sources eliminated by WR Grace.

My second comment has to do with my concern about the safe competent nature of the clean-up solution. It's short term and unproven. There are no contingency plans for failure of the CAP, no plans for money to pay for replacement thirty or forty years down the road, if it fails -- maybe I should say when it fails.

We have dealt with this problem for more than ten years, and I would like to have a solution that is permanently eliminating the problem, even if it is more costly and longer in time.

Thank you.

MR. HOHMAN: Thank you.

Jonathan Hudson?

MR. HUTSON: In my capacity as a journalist, in Nashua, New Hampshire, I've chronicled the on-going problems brought out in my community by the numerous chemical releases from the WR Grace facility there.

In the past two years, the Grace facility, in Nashua, has had more than several releases, according to Paul Kehoe, Acting Administrator, EPA Region One. This is prompted EPA Region One to perform in April of 1989, a multi-agency safety audit of the Grace facility, in Nashua.

This is remarkable for the fact that this is only the second safety audit ever performed in the entire history of EPA Region One. The first safety audit having been performed at the International Paper Company Mill, in Maine.

In other words, the WR Grace facility, in

Nashua, has compiled such an outstanding record as a chronic polluter that even the United States Environmental Protection Agency could no longer ignore it.

As you know, the citizens of New Hampshire, are presently concerned about the recent discovery of a cyanide contamination site along the western bank of the Merrimack River, directly below the Nashua facility of WR Grace. Grace officials had acknowledged that their Nashua facility is the probably cause of the cyanide contamination.

What the citizens of Acton need to know is that when Grace officials first reported this contamination site to EPA Region One, they described the blue cyanide stain as being "about twenty-five feet in length".

My newspaper, The Broadcaster, informed the EDA, that the blue cyanide stain, in fact, extends for more than a quarter of a mile in length.

My experience has convinced me that the presence of citizens of oversee the work of WR Grace and the EPA is imperative. Further, we have set up a precedent Sending Citizens Committee, to oversee the work of the EPA at WR Grace. This is setting a precedent across the nation, as this is -- such a committee has never before been set up for a -- Resource Conservation and Recovery Act investigation.

Further, New Hampshire Congressman, Chuck Douglas, will be holding an oversight hearing this fall, looking into how the EPA Region One has conducted its investigation of the WR Grace facility, in Nashua.

On behalf of the people of Nashua, I would now like to reiterate two questions raised by Mrs. Pichota previously.

1. Has the WR Grace facility, in Nashua, New Hampshire, contributed to the contamination of the landfill, in Acton, Massachusetts, and if so, the citizens would request a list of which specific contaminants Nashua might have contributed.

2. Does WR Grace have a contingency plan to transport any hazardous materials to Nashua for incineration at its Nashua facility?

I say this in view of the fact that I don't believe that the Acton facility of WR Grace presently has an incinerator on its site, whereas I know that the Nashua, New Hampshire facility of Grace does have an incinerator on its site.

If it be the case that WR Grace intends to burn any of its hazardous materials from Acton in Nashua, New Hampshire, then the people of Nashua do strongly object.

MR. HOHMAN: Wanda Mandile?

MS. MANDILE: My name is Wanda Mandile. I'm a member of ACES and a eighteen year resident of Acton.

After -- following all these people who really know what they are talking about technically, basically, I think Charlotte Sagoff did -- her comments did address concerns recovering the new landfill proposed, recovering well, and some new monitoring well, at the end of the lagoons.

I'm just going to leave you with some questions regarding that specific subject.

We're interested in the scheduling relative to the initiation of excavation activities, the sampling period required to avoid well installation effects, the number of samples required to establish a wide base line, and finally, will wells near sources with metal contamination and phthalate problems be analyzed for these contaminates?

Thank you.

MR. HOHMAN: Thank you.

Edgar Geithner?

MR. GEITHNER: I'm Edgar Geithner. I'm an Acton resident, and my comments concerns money.

We have a dump here that's going to be toxic for years to come, and from the last time you presented to us, I got the impression that nobody really knew how long.

The sources of money, to make sure that the solution works -- whether it is preferred alternative or something else -- are unsure. I guess it is based on taxes on penalties assessed to WR Grace.

I don't know whether the preferred alternative will work, and I got the impression that nobody else really does either. We may find out after thirty, or forty years, or more that it didn't work.

So no matter what technology you decide you to use, I'd like to recommend that a Trust Fund be set up, funded entirely by WR Grace, the amounts to be equal to the cost of the clean-up or something close to it.

I propose that this be an interest generated account, with the Town of Acton, as Trustee, and it would be used only for remedial maintenance of the site, as well frequent safety audits.

When it is determined that the site is no longer toxic and there is no further danger to the town's people, then I think the funds would be returned to WR Grace.

Thank you.

MR. HOHMAN: Stephen Anderson?

MR. ANDERSON: My name is Stephen Anderson. I'm an attorney from the firm of Anderson and Criger, formerly of Palmer and Dodge, the town council.

For a number of years, I and Bill Berzarno have represented the town, as legal and technical consultants, in this matter.

I wanted to comment briefly. We will be submitting detailed, technical written comments by the due date, but I wanted to suggest a number of concerns this evening that maybe reinforced by some of the public comments or, in turn, that it may reenforce things that people have already said.

We have met with the Board of Selectmen. We have explained to them our review of the plan and our recommendations, and we are here, at the behest of the Board, not to advocate for the EPA Plan or the Grace Plan, and at the same time not to recommend the design of a different plan.

Rather, as we have done in the past, we are here to respond to the proposal, as it is made, and to suggest areas of concern and areas of improvement, because even though the EPA Plan does incorporate some comments that the Town has already made and even though it does improve upon Grace's original Phase 4 Proposal, there are still significant areas of concern and areas for improvement. I would like to suggest several of those this evening.

One has to do with air monitoring -- on site and perimeter air monitoring. GCA recommends that both on site and perimeter air monitoring be required, both during the sludge excavation process and during solidification of the sludge and placement of the sludge.

If performance criteria during this monitoring are exceeded, then steps would have to be taken to correct the situation, but the citizens of Acton should not be exposed to unnecessary air emissions during the course of this procedure.

As far as sludge excavation goes, GCA recommends that procedures be implemented to minimize the liberation for fluid.

Currently, the proposal is to use a drag line to excavate from the lagoons. That is probably the least favorite alternative way of excavating from those lagoons.

Instead, GCA recommends that it backhoe -- similar to the types that are used for excavation of slurry walls -- be used in connection with excavating these sludge from the lagoons.

GCA recommends that consideration be given to solidifying more of the contaminated soils and sediments from the other waste sites, rather than simply placing them beneath the cap, as additional fill.

To verify the predictions that are made by various models -- including the K model -- GCA suggests using such tools as laboratory column bleaching tests, to verify particular contaminates concentration.

GCA, also, suggests consideration to the feasibility of placing the Battery Separator Chips in the Battery Separator Lagoons. This would consolidate those waste piles and increase the efficiency for the CAP for those particular wastes.

As far as the landfill is concerned, GCA has concerns about the cap integrity and the potential differential supplement. They suggest that one or a combination of the following be used to address these concerns.

Deep dynamic intensification of the landfill prior to the sludge cap placement. Use of a very heavy grade woven geo-textile between the soil fill and the sand bedding layer, and/or employment of a composite designed synthetic membrane to increase the tolerance of the cap differential settlement.

There are several other technical concerns that GCA has raised about cap design, but I would leave those for comments that we will submit in writing.

As far as cap monitoring goes, GCA recommends that some form of cap monitoring, other than -- platforms, be implemented shortly after construction, in order to pick up non-sediment induced breaches in the lining -- such as poor workmanship or inadequate precautions taken during construction.

An example of a technique would be -- based soil gas sampling for linear strips of geo synthetic drainage.

The Aquifer Restoration System is still operational, and it is one component of this, but there are concerns that we have, both now while it is operating and in the future, if it is allowed to be turned off.

One of those concerns is whether the captured area of the system includes all of the contaminated areas at the site.

The Town has submitted detail comments on the most recent Aquifer Restoration System Report. Those comments suggest that there are a number of areas of contaminates that are beyond the influence of the

Aquifer Restoration System and that are being allowed to migrate in various directions from the site. Those directions include towards the -- wells, and, also, toward the Assebet wells. These areas should be addressed and those contaminates should not simply be allowed to migrate.

On possible way of addressing this is to install an additional Aquifer Restoration System well, in areas of concern. Such as, north and east.

There have been concerns in the past about the ability of the Aquifer Restoration Tower to operate successfully and operate consistently.

Along the lines of the Verify theory, we would like to have the ability to make unannounced inspections of the Grace site -- both the EPA, DEP, and Town -- at least twice a quarter to inspect the various operating facilities out there -- the Aquifer Restoration Tower, plus the various wells, and so on -- to confirm that they are, in fact, operational.

As far as clean-up criteria go, the plan that you have proposed seems to have implicitly adopt maximum contaminate levels, as the clean-up goal, and these would presumably somehow be implemented as criteria ceasing the Aquifer Restoration Systems operation.

Selectmen do not agree that these criteria should be the ones to trigger ceasing the use of the aquifer restoration system. Rather, they believe that the strictest available criteria should be applied.

Those would include consideration -- for example -- of maximum contaminate level goals where those are relevant and appropriate, and other risk based target levels where there are no such goals.

In addition, these criteria need to be consistently applied over the entire area that has been influenced by the contamination, such that if you poked a hole anywhere in the aquifer, you would meet and exceed the standards.

As far as monitoring goes, GCA recommends that a more complete curtain of monitoring wells be implemented around the landfill. That is where a lot of these wastes are going to be left for an extended period of time or indefinite period of time.

These wells should be multi-level wells, and they should include areas such as between LM-2 and L-4, to close the 250 foot distance between these monitoring wells, northwest of LM-2, to monitor the western end of the landfill, and southeast of LM-8 to monitor the eastern end of the landfill.

GCA recommends that the monitoring of these wells not be limited to a 30 year time frame, as is suggested, but rather that no time limit on this monitoring should be involved. They should be monitored indefinitely into the future, and they should be monitored not only for the kinds of perimeters that have been monitored in the past, but also for additional perimeters. Such as, drinking water, metals, acid based neutrals, semi-volatile.

There are several institutional concerns that the Town has. Some of which have already been mentioned by the public this evening, but I wanted to reenforce those comments.

One of those has to do with a trust or ground water monitoring, and operation, and maintenance of this facility over time.

There are a number of different alternatives that can assure the finances are available, in the event of failure or problems with the system in the future. I would like to suggest some of those.

One would be Trust Fund. Another would be an agreement with Grace that in the event the property is sold, in the future, that a percentage of the sale proceeds be placed in escrow, in order to insure that this system will be operational and insure that the --

the cap and related facilities can be maintained and replaced, if necessary in the future.

The second concern, also along the lines of potential future sale of the property -- for instance, subdivision and building of homes or other buildings on the property in the future -- is that people be aware of the history of this property and have an easy way to get at the history of this property.

The Town suggests that one of the best ways to do that is to place a Notice in the Registry of Deeds, along with a plan that shows, in surveyed detail, where the waste locations exist today, and where the waste locations exist after the implementation of this remedy. That plan can then be easily consulted in the future, in the event of a Title Search or someone is purchasing a lot, and they will then know whether or not they are buying a lot that at one time had these primary lagoons on the property.

If possible -- if legally allowable, the Town would like to see land use restriction placed on portions of the property that include the landfill, in particular where waste will remain in the future, and potentially other areas of the site if residual contaminates remain there over time.

I won't take anymore time this evening, but we do have additional comments that we will be submitting on this.

MR. HOHMAN: Steve Grones.

MR. HRONES: That's Hrones. Steve Hrones, from Concord.

Everyone talks as though this is just an Acton problem, but it is very much a Concord problem, as a result of the Aquifer Restoration System clean-up efforts by Grace up to the present time.

As most of you know now -- hopefully from my other talks on other occasions -- the systems great for Acton. I don't think anyone is drinking toxic water, because what has happened is the wells take the water and pipe it to this air stripping tower that Peter is referring to.

The toxic -- the contaminates are stripped out of the water, and into the air. Well, there has been a technology for a long time. Carbon absorbs the system which is in most systems, and which grabs the contaminates, as they come out of the tower.

The problem is right down to the last five years, since March of '85, they have been coming out without any protective system, and coming across the Assabet, to my house in Concord.

What I'm asking the Board or the EPA is to not approve any plan that doesn't deal with the odor byproduct, as well as the contaminates. I think that's reasonable, apart from any regulation.

It makes simple sense that you don't take Acton problems and send it over to Concord, or you don't take the water problem and make it an air pollution problem.

So I believe you certainly have the authority to make absolutely clear that no plan will be approved unless Grace deals with the odor problem.

One must distinguish between your suggestion in the plan here -- the proposed plan that they put in a carbon absorption system and the odor problem. They are not necessarily the same thing.

The absorption system will take care of the five major contaminates, and that's very good. It should have been in a long time ago, because there are health concerns that are involved, apart from the odor problem, which is also a nuisance situation to the people in Acton, I understand, as well as Concord.

So as I understand it, you are requiring definitely a carbon absorption system, and that's good, and I ask that you put a time frame on that, because unlike the rest of the plan, there is no reason why that shouldn't go on immediately.

I understand that the other part of the project will take some further time and must be coordinated, but this carbon system should go on immediately.

The plan should also make clear that they also must deal with the odor problem, apart from the carbon absorption system, if that doesn't deal with the problem itself.

Once again, you do have the regulation -- the Massachusetts Air Quality Regulation that defines air pollution as creating a nuisance. So you have that regulation to force Grace to deal with the odor.

Once again, even apart from the regulation, it seems to me that no plan should be approved that has a byproduct an odor that creates additional new problems for neighbors, such as Concord and other citizens of Acton, in the form of air pollution.

(Applause.)

MR. HOHMAN: Florence Geithner? I'm sorry. Is it Bonnie Florence--

MS. GEITHNER: Yes. Florence is my legal name, but I just don't answer to it.

(Laughter.)

MS. GEITHNER: My -- my question or statement is four parts, and it concerns the holes that are going to be left around after everything is calmer into one part of that plastic sheet. It's going to break.

WR Grace's proposals for characterizing soils left in the excavated empty holes are grossly inadequate with respect to the three dimensional analysis of remaining contamination, in comparison with proposed soil clean-up values.

Multi-level sampling -- including actual soils samples -- is mandatory from the bottom of the lagoon excavation down to the water table.

Further, with increasing acid rainfall, what insurance is there that the metals and phthlates will not begin to migrate down into the ground water?

WR Grace appears to assume that these compounds are stuck permanently in that unsaturated soil just below their source lagoons. Are they?

Is future monitoring scheduled for those contaminates, in those empty lagoons, that Grace plans to fill with -- with soil and grass over? I am concerned about tall those residues and -- and the type of testing that is going to be done in those areas.

Thank you.

(Pause.)

MR. HOHMAN: Jack Ormsbee?

MR. ORMSBEE: My name is Jack Ormsbee. I'm a resident of Acton. I'm a member of ACES and a former Acton Selectman.

During my term on the Board of Selectman, in the Town, I had a number of negotiations and problems with WR Grace.

There was an emergency alarm that the Town required to be installed that couldn't be heard from five feet away.

There was as leak that started out as being less than a hundred gallons, and months later it had exceeded more than thousands of gallons.

There was an entire tank car, which was discovered buried in an area that was suppose to contain building materials.

During that term, my faith in the credibility of WR Grace sank so low that I was quoted in the press as saying that I wouldn't trust them as far as I could throw one of their batteries. I still say that, and my distance on battery tossing is getting less and less.

(Laughter.)

MR. ORMSBEE: However, I accepted Mr. Wilkes assurances that WR Grace is ready to -- like most of the citizens of Acton, I stand ready to be shown, but with deeds not with words. Also, I have a few specific comments on the plan.

EPA's nine evaluation criteria on page ten, and included costs, No. 7, and community acceptance, No. 9 -- it does not appear to me that these factors can be effectively weighed against each other, when community acceptability is not evaluated in their selection of a preferred alternative, whereas costs are considered from the upset in evaluating which alternative is preferred.

In conjunction with that comment, it is also not clear to me -- I don't believe to ACES either -- what weight is given to benefits versus costs? What are the benefits considered?

Secondly, -- that even after the clean-up plan is carried out, tests will be required to determine whether the contaminates are present.

Some of these things infer to the possibility of finding contaminates not previously identified.

Shouldn't one of the objectives of the Clean-Up Plan shown on page one -- perhaps the first one -- be determining the nature and extent of contamination, and shouldn't this step be taken before the entire Clean-Up, in order to be sure that it accurately addresses the nature and extent of all the contaminates, including those that have not yet been identified?

In this respect, I support whole-heartedly the idea presented by Bob Eisengrein, of ACES, that a back-up opinion to determine whether there cannot be another method that can really define the problem before the Clean-Up Plan is in tact.

Thank you.

(Applause.)

MR. HOHMAN: Ed Richter.

MR. RICHTER: My name is Edward Richter. I'm a thirty some odd resident of Acton, member of the School Committee and Board of Health at various times, not now.

I'm also an engineer and an editing of The Engineering Journal, and one of the things that I asked at the last meeting in August was what kind of technology was to be used as sensors and in particular at that time I was inquiring about the emissions from the instrument tower.

I was told that none -- no particular techniques had been looked at, and I was a little bit aghast at that, and I would suggest that there are a lot of times when you're going to have to monitor the air emissions and water emissions for contaminants to the water.

I would suggest that you early in the program look into what kind of sensors are available for what kind of contaminants you have, identify them, identify their sensitivities and arrange for some sort of unified communication of all their outputs to one central computer where you can -- where you can record your data continuously.

I have a paper in my -- my bag here that was contributed to our journal from India where they monitored all kinds of emissions in the Hooghly River.

Originally, the wanted to call it Hooghly water monitoring or something like that, and I told them take out the Hooghly, and I think the third world countries are very intimate.

They have massive populations, and they have massive -- massive pollution problems, and they're looking into this, and they get together with the universities.

This, I think, was the University of Calcutta, and they -- they selected techniques that can be used, and they used radio sensors from -- in the river back to the central place where they recorded all this data, and they -- they really had on-line monitoring at all times.

I think this is the kind of thing we should do. I think -- when I was on the Board of Health, I was appalled that most of the time we were monitoring things, we took a sample and waited four or five days until it grew into something.

You don't have to do that with chemical pollutants. Maybe with biological pollutants you do, but even there I think there are better -- better approaches that we should investigate.

Now, I think Grace's is a strong technical company. They know about computers. They know about monitors and sensors, I think, and they should be able to provide a lot of input on that.

EPA also should provide a lot of input on that, and if you want any -- or anything like that, I'd be glad to help you.

Thank you.

(Applause.)

MR. HOHMAN: George Emmons.

MR. EMMONS: My name is George Emmons, and I've been a resident of Acton for 11 years and am currently on the Board of Health. I'm not speaking for them tonight though.

I have a couple of questions and a couple of comments, suggestions to reinforce those that have already been made.

One question is why shouldn't the chip pile be blended with the fill from the other areas and put on the landfill and spread there as a fill layer, and the result would be that this waste pile would be under much better control and in an area that's not hydrologically connected to the -- wells.

Another question is what's the effective life time before significant decomposition of the BFL stabilized contaminants occurs.

How do the decompose? Do they decompose gradually or precipitously after an indefinite time?

My comments. I do think that an escrow account should be established to be used as needed to fund remediation if and when decomposition of the BFL stabilized contaminants occurs.

This should be done regardless of the present land's stated life time because life time estimates are hard to make, especially if they are long.

So a long term solution may turn out to be needed more quickly than is now predicted because of the difficulty making the prediction, and it may be needed some time much -- in the future, and some money will be there.

Also, read the rate of decomposition. As I said, it may not be uniform. It may occur precipitously after a long indefinite period and then repollute the groundwater in the Assabet River unless further remediation is undertaken at that time, and the funds will then be available for that remediation.

Finally, let me make a comment that's based on my experiences with the Board of Health. I know firsthand that in some cases of repairs or additions to house here in Acton, that we require the owner of that house to file a letter with the Register of Deeds stating what has been done because it's significantly different from a house that a person might be buying with respect to --

Now, I suggest that the comment made that Grace be recorded -- refers to -- and planning and the details where all the pollutants are on that site so that it's known long in the future to any buyer is a very good suggestion.

It's one consistent with what we on the Board of Health require of the citizens of Acton, and I don't think that that's an unfair thing to ask of the Grace Corporation who are also citizens here in Acton.

Thank you.

(Applause.)

MR. HOHMAN: Paula Bushkoff.

MS. BUSHKOFF: My name is Paula Bushkoff. I'm a citizen in Acton. I've a series of -- questions.

If flushing of the primary -- is needed because soil tests show contamination above SCD levels, will the flushing begin during the 1990 construction season, or will it be postponed?

Who decides this? What are the criteria? What happens if two lagoons need flushing? Describe how samples from -- ways and meadows will be obtained -- excavation. What is the time frame for analysis?

Will W. R. Grace seek on-site GT analysis for BLA's during soil sampling? If not, why not?

MR. HOHMAN: Thank you. Margaret Korde.

MS. KORDE: My name is Margaret Korde, and I have some comments really just to reinforce and reiterate what I've heard tonight.

I think it's clear that what you're proposing, what Grace is proposing, doesn't seem to be an acceptable -- it's definitely not a permanent solution.

It looks to me like we are going to need funds available to be sure that we can monitor the site forever and that there are funds available to be able to continually see such -- other types of remedial action.

I would just reiterate that I think that Grace has said that they want to prove that they intend to act in good faith.

They want to be an asset to the community. I think it's time for Grace to come forward and offer an amount of money be set aside --

Thank you.

(Applause.)

MR. HOHMAN: Valerie Nelson.

MS. NELSON: My name is Valerie Nelson. I'm a citizen of Action for 29 years and a member of ACES.

I'd like to make a few brief comments and give those present some food for thought on some of the computer simulations that the EPA has in its possession.

These are computer simulations of possible flow tracks from the landfill. They are used by W. R. Grace, according to a letter of August 31st from Mr. J. Armor to the EPA, to show that, "The contaminants cannot impact the drinking water of the present Assabet Wells Nos. 1 and 2 or the future Assabet 3 which is at the location of the W. R. Grace No. 3 well.

"This would be the case even if the landfill was left without a final cover or cap as shown on the attached computer simulation, Figure 1."

W. R. Grace states that, "With Assabet No. 1 and No. 2 wells and the future Assabet No. 3 operating at normal capacity, no contamination from the landfill will be drawn into the wells even if the landfill were left uncovered or there was a failure of the cover."

Several technically competent people who've reviewed these computer simulations claim that Figure 1 shows no such thing and that, in fact, it does not represent reasonably expected future contours or flow directions.

It's their contention that a reasonable worst case simulation would instead do any or all of the following: Would pump W. R. Grace No. 3 water to the Acton Water District System and not to the sinking pond as shown on 301; would shut off the reach-outs -- ponds since W. R. Grace has never assumed responsibility for maintaining this hydraulic barrier; would shut off the aquifer for the restoration system; would impose 180 day drought conditions; and would also assume no cover on the landfill.

Food for thought.

(Applause.)

MR. HOHMAN: Joseph Conuby.

MR. CONUBY: My name is Joe Conuby, and I'm a resident of Acton for 20 years. My concern is with, first of all, the intent to stabilize the waste rather than to properly treat it and, secondly, with the stabilization process.

A comparable process exists, and there's considerable data on it. Statelex (phonetic)

Corporation has operated a hazardous waste facility -- for a number of years.

They use a lime and cement to stabilize the waste. They will not accept any type of waste containing organic contaminants.

The process is effective, approved by the EPA for inorganic materials. Further, after they treat the material and it is classified by the EPA, in other words not --, they dispose of the material in a plain pit which is subsequently covered with a barrier.

This is in an area where the surrounding community is served by a municipal water system. I think that you should look very carefully at the effectiveness and, indeed, the intent to stabilize the waste leaving a problem in the future.

(Applause.)

MR. HOHMAN: Tony Mandile.

MR. MANDILE: My name is Tony Mandile. I've been a resident of Acton for 18 years and a member of ACES since 1978.

Sand and gravel was one of our earliest loams. Sand and gravel was one of the earliest concerns in that area, Grace area, in question.

We will -- Grace has -- to supply common fill be located, how big it will be, will it create --

eyesore from any offset point and what are -- the gravel pit, but a -- view. Last, are there any --

MR. HOHMAN: Christine MacDonald.

MS. MacDONALD: My name is Christine MacDonald, and I've been a resident of South Acton for two and a half months.

FROM THE FLOOR: I can't hear you.

MS. MacDONALD: My name is Christine MacDonald, and I've been a resident of South Acton for two and a half months.

Since I've lived in South Acton, my family has noticed two or three times a week a strong chemical odor coming into our house.

It took us six weeks to understand what that odor was, and we believe that it comes from the stripping -- at the Grace plant.

My comments should be addressed primarily to my concerns about emission. In a proposed plan, it states that new towers will be -- will be equipped with a carbon absorption technology to maintain the air emissions, but not all the old towers will have that technology added.

I believe that all of the towers should have the carbon absorption because we certainly are noticing the odors now, and as I understand, other people in the area have noticed it for many years.

My other concerns to do with air emissions come from reading the proposed plan. I believe that when the lagoons are excavated and when they're mixed to -- process, when all of that material is stirred up, I believe that the -- compounds, but we can't literally -- the air.

I don't know if there's any way to contain those materials during that process. I hope that there is, and I'd like to see the air tested during that process.

My third concern about air emissions has to do with the covering over the landfill. I'm concerned on reading the proposal, as I understand it, the way you're treating the air emissions, they'll not be determined until after the landfill is covered and the air is tested.

I think that's too late. When I read that, I get the impression that nobody knows what emissions will be coming out of the landfill and that's why nobody knows what the best available technology is. I find that unacceptable.

I have one other concern that's not related to air emissions, and that has to do with the landfill -- the contaminated material that is present in the landfill that will not be --

It seems to me that when other materials added to that landfill to fill it up to the surface of the ground and then heavier materials are added to the top, that there will be much displacement of the materials and the landfill.

Granted, there's a little more contaminants coming out of that landfill towards the Assabet River and that -- today will not contaminate the water supply.

However, the materials are added on top of it. I don't understand why we can be so certain that there won't be shifting of materials and that the nature of that fill might change and the water supply would be contaminated.

I don't know of any way that if that were to happen it would be possible to go back into the landfill and remove those materials.

Thank you.

(Applause.)

MR. HOHMAN: Pamela Kelly.

MS. KELLY: In the interest of time, I'm going to -- little card because you're not going to answer tonight anyway.

I'm going to just say a word to reiterate what other people have said. I want to admit to you here tonight that I'm a terrible housekeeper, but if I took a rug five acres large and swept the dirt under it and -- it to stay there for 30 years, I wouldn't just be a terrible housekeeper, especially if something is carcinogenic -- to find out just how carcinogenic it has been and all of a sudden air contamination somehow may yet bear fruit in the sense of possible suits of companies that don't deal responsibly -- that don't deal responsibly with contaminants that they know or -- that they know --

Now, I think -- going to deal with this because citizens of Acton who may die of cancer because of lack of action.

There's no apology that's acceptable for that.

(Applause.)

MR. HOHMAN: You would like to have this question put into the record?

MS. KELLY: Yes.

Question: Grace proposes that material with more than 100 ppm VOA be incinerated and estimates that about 20 cubic yards are likely to exceed this limit.

What instruments and procedures are used to reassure this during excavation? Would there be any problem if the estimates turned out to be ten times too low? When will this hot stuff actually be, (A), excavated from blowdown pit, before or after the cooler stuff around it, and, (B), removed from site?

MR. HOHMAN: Lorraine Carter.

MS. CARTER: My name's Lorraine Carter, and I'm an Acton resident and also a member of ACES. I just have a few specific questions regarding the landfill.

What are the allowable levels of -- chloride emission in the landfill? Is the Grace landfill likely to exceed these limits? What will be the control survival?

Thank you.

MR. HOHMAN: Ken Appel.

MR. APPEL: My name is Ken Appel, an Acton resident for 14 years. I just have a couple of questions that are directed at the water entrance sinking pond.

Since its start-up in 1984, the aquifer recovery system has been dumping treated waste water into the sinking pond.

This waste water is very rich in iron, and it creates an orange slim iron mask that accumulates in a cascade ditch leading to the pond.

In its original plans, W. R. Grace proposed to trap this slim in a ditch above the pond. More questions, basically, relating to that.

Is the trap operating? Second, has the trap ever been cleaned? Is there a schedule to clean it periodically? If not, an inefficient or inoperable trap allows particulars to enter the pond that will probably never leave.

The last question, once the Aquifer Restoration System is shut off and the level of the sinking pond subsides, what plans does W. R. Grace have to stabilize exposed shores to prevent erosion of sediment?

Thank you.

MR. HOHMAN: Richard Kedugan.

MR. KEDUGAN: Mr. Hohman, my name is Richard Kedugan.

MR. HOHMAN: I'm not having much luck with names tonight.

(Laughter.)

MR. KEDUGAN: That's understandable. I've been associated with the actual Grace site since early 1978, and I think I'm probably the most senior technical people still --

FROM THE FLOOR: Louder.

MR. KEDUGAN: I have a simple question concerning -- that draws a parallel between underground tank testing that when practiced -- for all underground storage tanks for hazardous materials and the proposed landfill which you could call an underground -- storage area.

I think that it would be a reasonable request for Grace to have to perform an integrity test on the cap every two or three or four years such as we require of anyone who stores hazardous materials underground.

The problem I see with that right at this moment is that the plans proposed by W. R. Grace in their Phase IV Addendum for venting and a testing procedure that involves use of the banks are apparently contradicted by Page 15 of the EPA proposed plan such that internal vents from the landfill materials that exist at the site now are not allowed to vent below the cap.

They are -- must be designed, according to Page 15 of the EPA proposed plan, to go right up through the cap to the surface.

Simply, I'd ask how the heck are we going to test the integrity of the cap using a vent system which I thought was -- had some attractive features and, lastly, why don't we institute a plan that uses the vents to pump in a tracer -- perhaps with just helium which is used to test tanks and find any leaks on a regular bi-annual or three year schedule?

In other words, treat this as an underground storage tank in some respects.

Thank you very much.

(Applause.)

MR. HOHMAN: Nancy Cadwgan.

MS. CADWGAN: In the interest of time, I will not ask my questions that have been aptly phrased by many members of ACES.

I would just like to say that ACES has monitored the problems with Grace and has been a watch dog since 1978, and we were the first group to identify the problem.

I think the -- questions that they have raised here deserve some very close scrutiny by the EPA with preferred alternative solution --

(Applause.)

MR. HOHMAN: Carol Mackey.

(No response.)

MR. HOHMAN: Carol Mackey.

(No response.)

MR. HOHMAN: Of Acton.

(No response.)

MR. HOHMAN: Nancy Fox.

(No response.)

MR. HOHMAN: Nort Salz.

MR. SALZ: I'm Nort Salz, a resident of Acton. I don't know that I can add anything new. I really just want to underscore what a number of people have raised so far.

In particular, I would like some kind of assurance that, in fact, the many technical points and other concerns that people have raised are, in fact, going to be addressed.

It seems to me pretty clear that the proposed alternative is not going to work and that some other approach, probably something that includes some kind of a biodegradable approach, is something that will have to be looked at.

I really hope that Grace will, in fact, collaborate with ACES and some of the people who've done a lot of careful research on some of these difficult questions.

MR. HOHMAN: Thank you. Pam Resor.

MS. RESOR: Pam Resor, former Acton selectman from '81 until '87, so I've been involved in this --

FROM THE FLOOR: Louder.

MS. RESOR: And I'm also a member of ACES. Throughout the past ten years and continuing, -- specific performance standard, well supply procedures, monitoring specific points to be assessed for two years, -- to the site -- maintenance plans.

We demand that this most important clean-up phase is a solution and not just a cover up. I honestly knew exactly what standards and criteria were used to -- design the standards.

It provides a solution. During an earlier meeting, the response to many of our questions was that question will be answered when we get to the -- design phase.

The greater concern is that EPA is selecting a preferred alternative with so many unanswered questions.

If it's in a design phase, first the questions cannot be answered or raises more questions. Can you alter your financing --

What public review will be provided during the design phase? Will we be given an opportunity to see that -- the design data to answer our questions?

(Applause.)

MR. HOHMAN: Gil Wooley.

MR. WOOLEY: My name is Gil Wooley. I'm testifying on behalf of the New England Chapter of the -- Club.

We were -- actually, one of our groups which is no longer active, I guess, was actually the first to go into the site and take photographs of the dump and to see that lovely pink froth of the lagoons.

Since then the ACES have done a wonderful job. I have to pay tribute to them. It's the best -- most popular civic group I have ever experienced.

I don't have to go over what other people have said, but I've been finally getting the things in from CVA for ten years now.

It seems as though there was a great amount of studying being done and something good should come out of it.

When your final election date -- that old saying came to me, the mountain has been in labor, was brought forth announced.

Ten years ago, I understand something like $2 million and you've come to the right recommendation which the first year -- engineering student came up with it as a cost project fee --

I don't want the -- I associate most of the remarks made by previous speakers except those regarding the cap.

I -- we are not interested in the cap. This -- you've got a cultivation there. If the cap is successful in containing the material, then it will be there forever.

If it isn't successful, it will -- you can't have it both ways, so the only solution -- if this site could be cleaned up, then you will get all the materials in one place, you'll go in there expedite and it's not the -- it's not the question of -- it's not some difficult site in the middle of the city.

There's lots of room on the side. In ten years you could have cleaned it up with not much more than you've spent, I'm sure.

This is really -- collected by the -- another environmental organization -- and this is typical of what the EPA's recommending, cover-up, not clean-up.

Sometimes there's a justification for it, but in this case they could have cleaned it up -- there's no such thing as a permanent cap. No one will ever believe that.

You'll have to stop trees growing on it

forever, and if -- it will be there forever. You can't say you're containing it and yet -- because nothing -- as far as I know, there is no biological -- of material when it consolidates.

It in some way -- eventually it will be great. What you're doing is just making the sort of time bomb for the future.

One thing that hasn't been mentioned, if it's term and people can be -- there that Grace has moved this highly acid soil from the -- site onto the site, this changes the whole chemistry of it.

The solids that have been there already are not -- to method, but the material on the old -- site is so acid they have to move it or they could pour concrete with the red --

It would have leaked the calcium carbon and -- cement. That's our -- if that starts to seep down into the metal, then you've got the whole hill of problems that haven't even been addressed.

The only solution to this thing is to clean up the site. Now, how are we going to address this? I think all of you will have to think of the political -- and state -- it's not clear that the state doesn't still maintain some jurisdiction over the -- over the site.

The EPA's -- supposed to be in conformity with state rules. It's not clear. I've talked to attorneys about this, and it never was quite clear, but if we can get enough politicians to state an interest in it, I think we can force Grace to do this.

They can well afford to do it. They've caused enough environmental problems in New England to at least effect some restitution to the city for the things they've done, and they can well afford to do it.

They're one of the top 50 corporations in the world, I believe, so it's not like somebody who the Board of Selectmen suddenly find they've got a toxic waste site which is unfortunate sometimes.

Grace created the problem, and Grace can afford to fix it, and Grace must be made to fix it.

(Applause.)

MR. HOHMAN: Susan Fingerman.

MS. FINGERMAN: My name is Susan Fingerman, and I've been a resident of Acton for 18 years. I don't have a technical comment or question, but I do want to say in 1971 we were a neighbor of Grace's on Parker Street.

I was one of the several people calling the Board of Health at least once a week complaining about the odor that was --

At that time we were told eventually that it was -- which is not at all to be of any concern and that Grace was willing to go through several mapping procedures and do some bending at night, and we moved away.

We're still in Acton, but we moved away from that area about three years after that still having the odor problems, and I'm hoping that this is not another mask and that 18 years from now we are not going to be here again trying to find some solution --

(Applause.)

MR. HOHMAN: Could we have just a clarification, if you wouldn't mind?

MR. BOYNTON: You mentioned you lived on Parker Street and you moved to somewhere else?

MS. FINGERMAN: Right.

MR. BOYNTON: And where is that?

MS. FINGERMAN: West Acton.

MR. BOYNTON: And you still have odor problem there?

MS. FINGERMAN: No, no, but I understand someone that's been there two and a half months has an odor problem.

MR. BOYNTON: All right. I misunderstood what you said. Thank you.

MS. FINGERMAN: I'm sorry.

MR. HOHMAN: Thank you. Again, Carol Mackey.

(No response.)

MR. HOHMAN: Nancy Fox.

(No response.)

MR. HOHMAN: Is there anyone who hasn't been called on who wishes to make a statement? Yes?

MS. KELLY: Can I make a request?

MR. HOHMAN: Yes. Why don't you come up to the microphone, please, so we can put it on the record and identify yourself, please?

MS. KELLY: I'd like to see that this material is sent to the -- so that it can be published in the paper and not have any more sent undercover to a few people who -- that -- my name is Pam Kelly. I'm from South Acton.

MR. HOHMAN: Which material are you talking about?

MS. KELLY: The answers to these questions and some of this data.

MR. HOHMAN: Okay. Let me thank all of you.

MS. FOUNTAIN: I have a question.

MR. HOHMAN: Do you have another question or comment?

MS. FOUNTAIN: My name is Marian Fountain, and I'm an Acton resident for two years. I also live on Parker Street, and one thing that nobody mentioned was the truck traffic.

We have lots of huge trucks going by all the time, and my question is what is in these trucks? What happens if somebody gets in a car accident and crashes into one of these trucks in front of our house?

There are -- all over the place. What if that -- what are the health hazards of that? I want to thank ACES for the wonderful job they've done.

Unfortunately, I'm not -- basis, but I wish I was. I'd like to also remind everybody that what we're really talking about is the future of the children in this town.

I'm a parent, and I'm also the school psychologist at the junior high school, and I have a very deep concern about the children and what effects this all might have on them.

(Applause.)

MR. HOHMAN: Thank you. I'll bet a cup of coffee you're a member of ACES before you get out of the building tonight.

(Laughter.)

MR. HOHMAN: Anyone else? Down in back.

MS. BAILEY: Yeah. I'm Martha Bailey, President of the National -- Campaign, and I was wondering if you people have heard of landfill mines (phonetic).

I'm hearing a lot about landfills here tonight, and as far as I can find out and as far as I see or hear, it's barrels that are empty, landfill that are buried, and --

Why don't we take them out, and why don't we take what soil is in that landfill before we start putting something else in?

So -- out of here.

MR. HOHMAN: Thank you. Anyone else?

MS. MORGAN: My name is Andrea Morgan, and I'm a resident -- former resident of Acton for 18 years.

I have a few questions -- first of all, the lagoons. What happens if water seeps into the lagoons and, if so, would it be contaminated, and, if so, what would be done to the water?

Second of all, is there anything wrong with the landfill, and, if not, why not, and what would happen if our -- toxic sneaked through the landfill underneath --

MR. HOHMAN: Other comments?

MR. WILSON: My name is Matthew Wilson, and I am the Director of the Massachusetts Campaign to Clean Up Hazardous Waste.

We're a statewide group that works with about 50 community groups across the state dealing with toxic waste setting in our communities.

I wasn't going to say anything tonight, but I just want to make a comment that I think the comments by the citizens here and the show up of how concerned citizens here are is very important.

-- allowed the other groups across the state, and our experience with other groups is that by taking in comments and taking into account the comments that people have said here tonight, I think will make the clean up much more effective and happen a lot quicker.

We've seen that in other sites across the state where the EPA and DEP has really taken into account these comments.

That's when clean-up has happened quicker and more effectively so I just hope that in -- important comments that people said here tonight are all incorporated in because you can see from the crowd here if it's not done right the first time, we're going to be back here again.

Thank you.

MR. HOHMAN: Thank you. Anyone else?

(No response.)

MR. HOHMAN: Okay. I want to thank you all for your courtesy and your participation this evening. I would remind you all that the agency will continue to accept written comments up until September 15th, comments postmarked September 15th.

I think we had the address posted a little while ago, and we'll ask that it be put back up on the screen here so you know where to send your comments.

Also, the comments I think--

MR. BENOIT: Comments can be made directly to EPA or to us.

MR. HOHMAN: We are working with DEP on this and have told them that we will share with them all of the comments that we receive.

They, in turn, are giving us any comments that they receive. If you want to comment to the Massachusetts DEP, it is Mr. Michael LeBlanc with the Massachusetts DEP, Bureau of Waste Site Clean-up, 75 Grove Street, Worcester, MA, 01605.

You can send comments to him as well, if you'd like. Again, as I indicated, when EPA now --

after the comment period closes, we will be evaluating all of the comments and the questions that we have heard tonight and also that we receive in writing.

We will be making a decision on the clean-up remedy for this particular site. As part of that process, we will be preparing what we call a responsive summary which will be EPA's answers to all of the comments that we have received during the comment period and will at that point attempt to answer any of the questions, also, that have been raised here and have not yet been answered.

Are there any other comments before I close the hearing?

MS. SAGOFF: Excuse me. Can you explain about the ROD? I think many people--

MR. HOHMAN: I'm sorry. I have a tendency -- I'm a bureaucrat. ROD stands for record of decision.

It's the clean-up remedy. Probably EPA could simply say it's the clean-up remedy, but we have to call it a ROD or record of decision.

That will spell out what the remedy that we are going to implement at this site will be.

Okay. Again, thank you all for coming. I will be leaving, but I think a few of the EPA staff will stay around for a little while.

If you have any more questions or comments, you want to speak to them and get a little more information to help you prepare your comments within the comment period.

We thank you very much. The hearing is adjourned.

(Whereupon, at 9:30 p.m., September 12, 1989, the above matter was concluded.)

CERTIFICATE OF REPORTER AND TRANSCRIBER

This is to certify that the attached proceedings before: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY in the Matter of:

W.R. GRACE SUPERFUND SITE
PROPOSED PLAN

Place: Acton, Massachusetts

Date: September 12, 1989

were held as herein appears, and that this is the true, accurate and complete transcript prepared from the notes and/or recordings taken of the above entitled proceeding.

S. French Reporter	9-12-89 Date
E. Scannell, D. Brideau, S. Hayes Transcribers	9-14-89 Date

APPENDIX C - ADMINISTRATIVE RECORD INDEX

not included.

APPENDIX D - STATE CONCURRENCE LETTER

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
One Winter Street, Boston 02108

Daniel S. Greenbaum
Commissioner

September 29, 1989

Paul Keough
Acting Regional Administrator
U.S. EPA
JFK Federal Building
Boston, MA 02203

RE: Acton - Concurrence with ROD for W.R. Grace Federal Superfund Site - Source Control Operable Unit #1

Dear Mr. Keough:

The Department of Environmental Protection (The Department), formerly the Department of Environmental Quality Engineering, has reviewed the preferred remedial action alternative recommended by EPA for source control measures at the W.R. Grace federal Superfund site. The Department concurs with the selection of the preferred alternative for source control measures.

The Department has evaluated EPA's preferred alternative for consistency with M.G.L. Chapter 21E as amended in November, 1986. The Department has determined that the preferred alternative, that includes excavation and stabilization of lagoon soils and sludges, consolidation of waste materials on the industrial landfill, capping of the landfill, and on-site groundwater recovery and treatment, is consistent with the requirements of M.G.L. Chapter 21E and the Massachusetts Contingency Plan (MCP). Chapter 21E allows the implementation of remedies on portions of a site to address pressing hazards. In addition, the MCP allows the implementation of permanent solutions on portions of disposal sites in combination with temporary solutions on other portions when a permanent solution for the entire waste disposal site is not feasible. A permanent solution does not seem feasible at the industrial landfill at this time. However, capping and post-closure care of the landfill, including monitoring and groundwater recovery, combined with appropriate land use control provide a suitable temporary solution as described in the MCP. A final determination on the remedy regarding permanency standards contained in MGL c. 21E and the MCP will occur when all remedial measures for the entire Grace site have been selected and implemented.

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The Department has reviewed the ARAR's identified for the Commonwealth and believes the proposed remedy will meet these. This will continue to be evaluated as remedial design progresses and during implementation and operation. In addition, we will continue to identify ARAR's during remedial alternative evaluation of subsequent operable units at the W.R. Grace site.

The Department looks forward to working with EPA in designing and implementing the preferred alternative for source control and in developing additional remedial measures for groundwater remediation. If you have any questions or require additional information please contact Jay Naparstek at 292-5697 or Michael LeBlanc at 792-7653.

Very truly yours,

Daniel S. Greenbaum
Commissioner
Department of Environmental
Protection

cc: Edmond Benoit, CRO
Anne Bingham, OGC
Steve Richmond, OGC